No. 622,871. Patented Apr. 11, 1899.

C. H. STOELTING.

MACHINE FOR CRIMPING PAPER.

(Application filed July 6, 1897.)

(No Model.) 7 Sheets—Sheet 1.

Fig-1

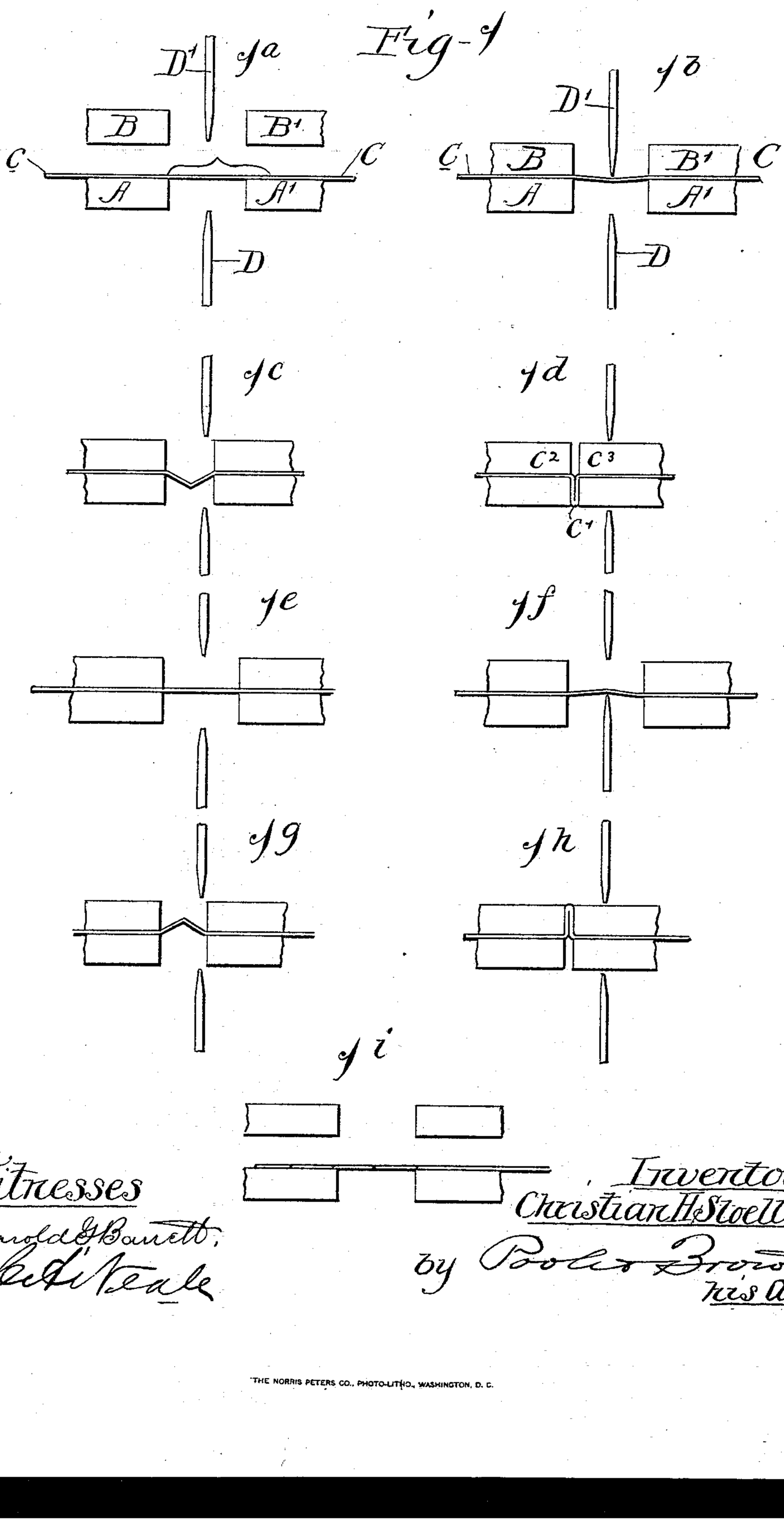

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Fig-11

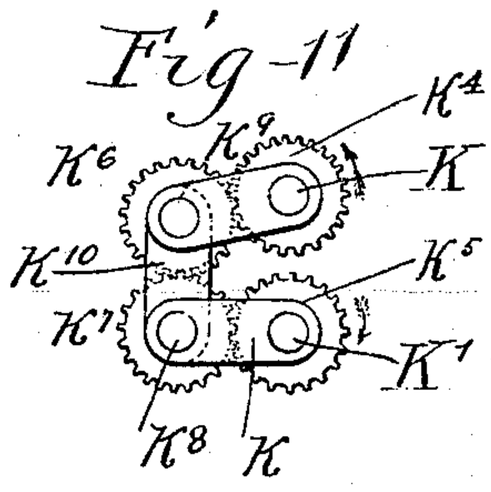

Fig-2

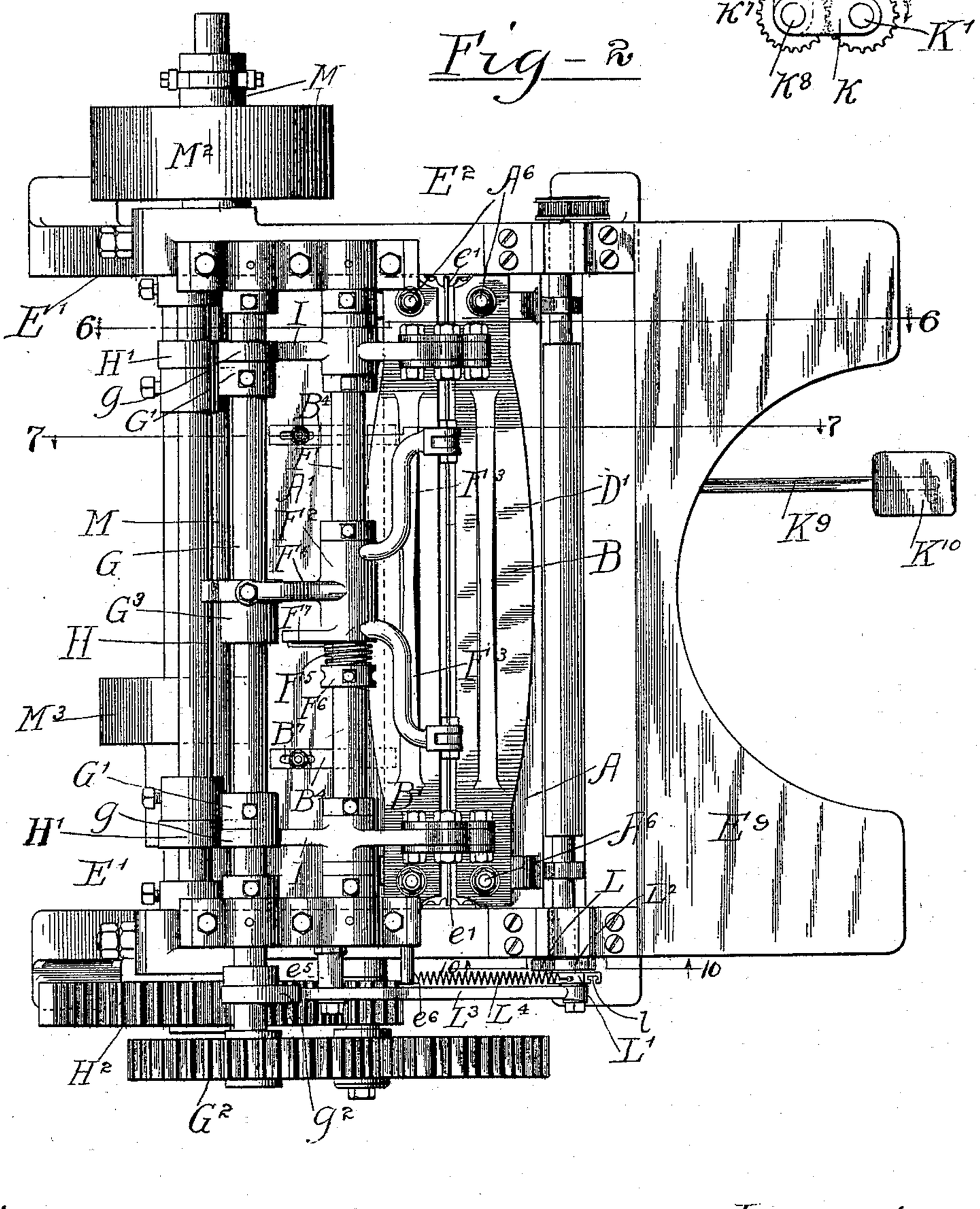

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Fig-3

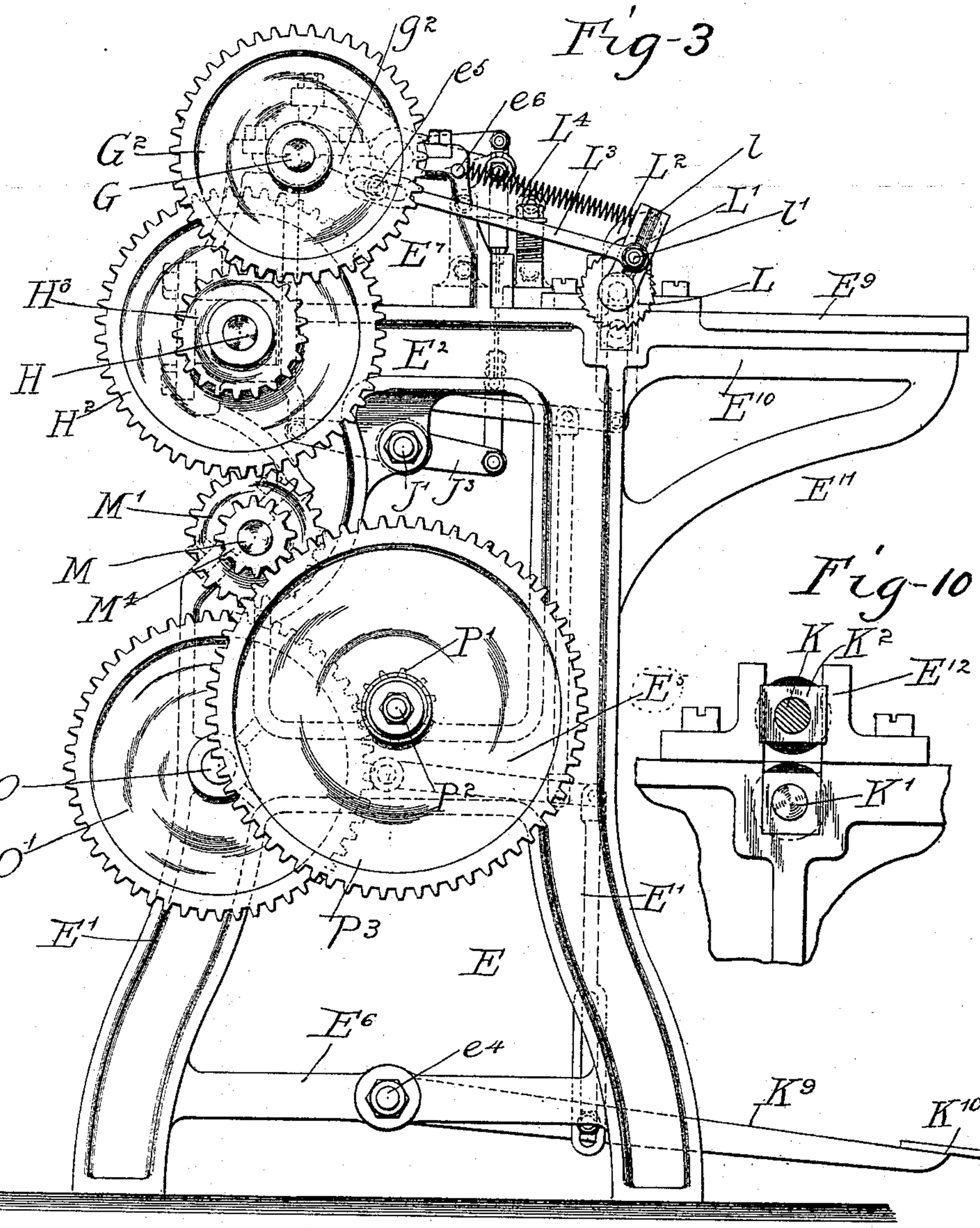

Fig-10

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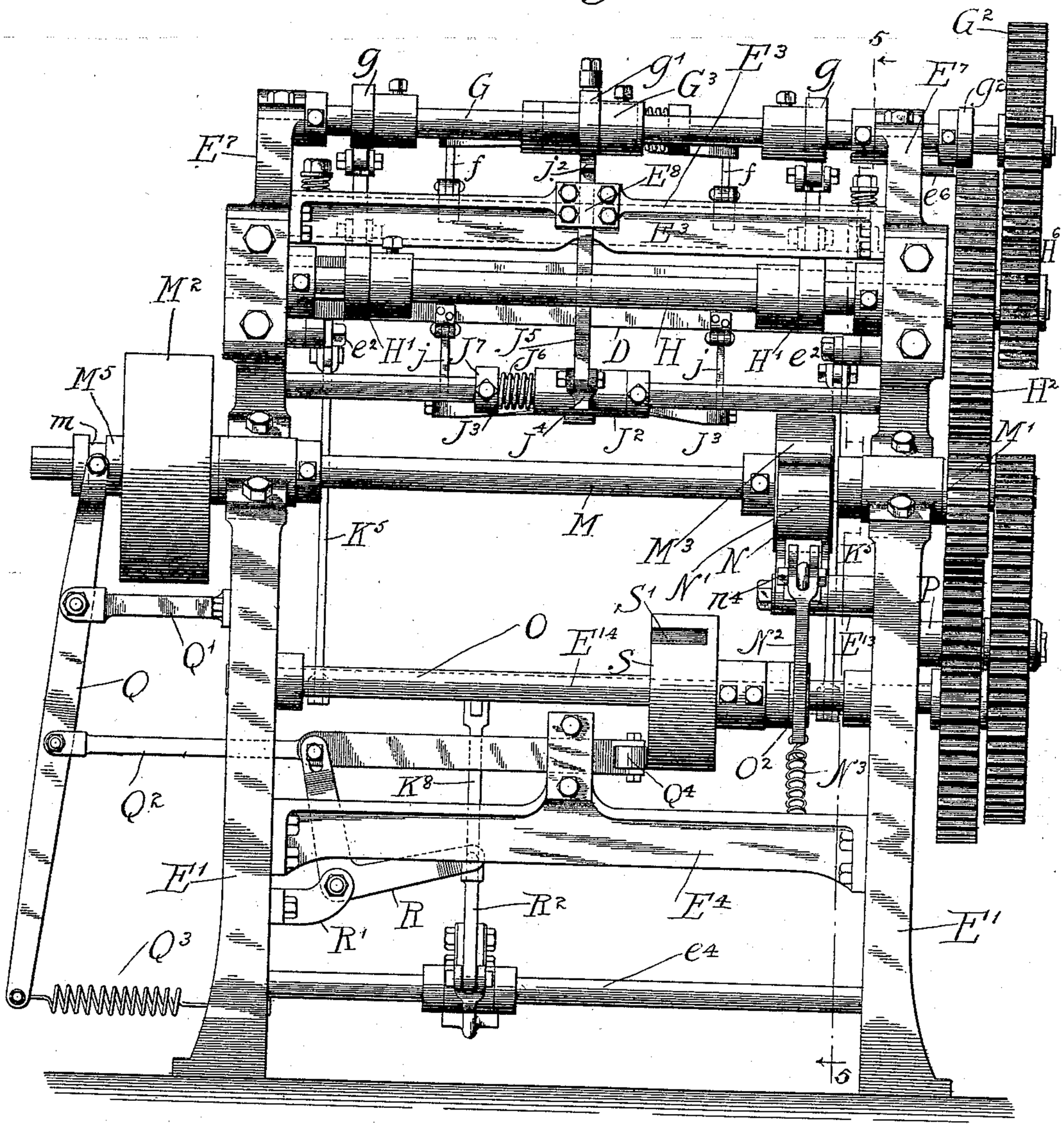
(No Model.)

7 Sheets—Sheet 4.

Fig-4



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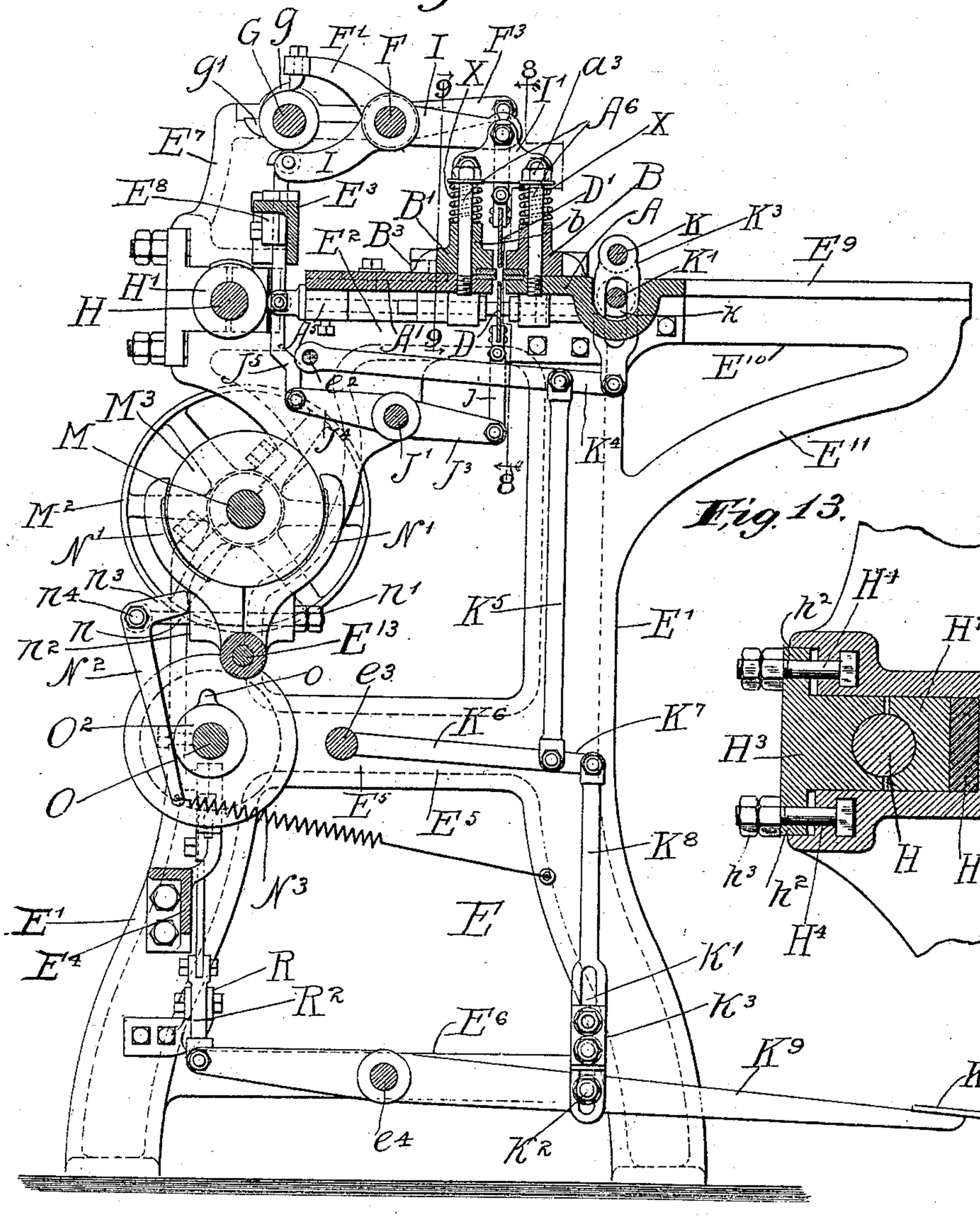
(No Model.) 7 Sheets—Sheet 5.

Fig-5



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(No Model.) 7 Sheets—Sheet 6.

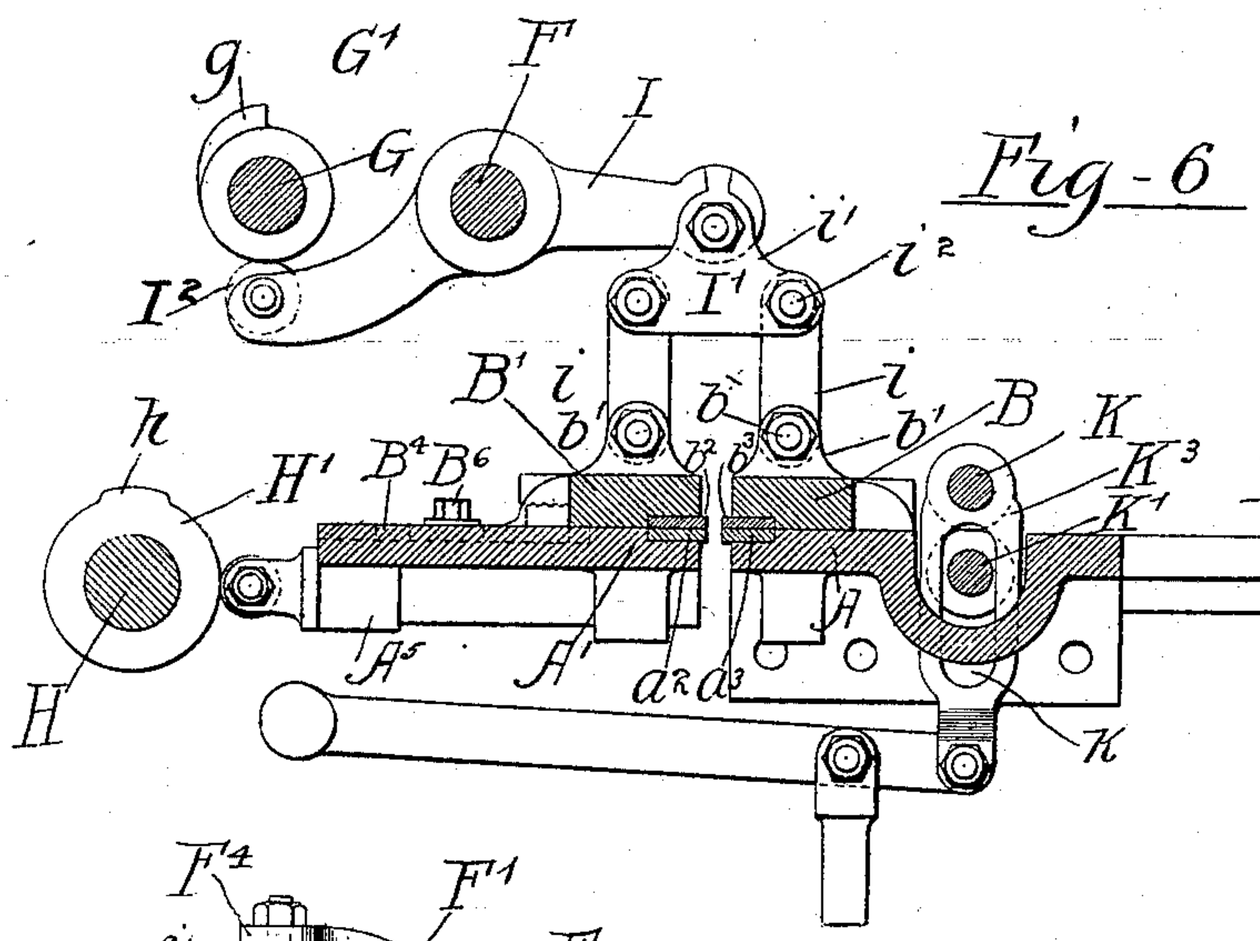


Fig-6

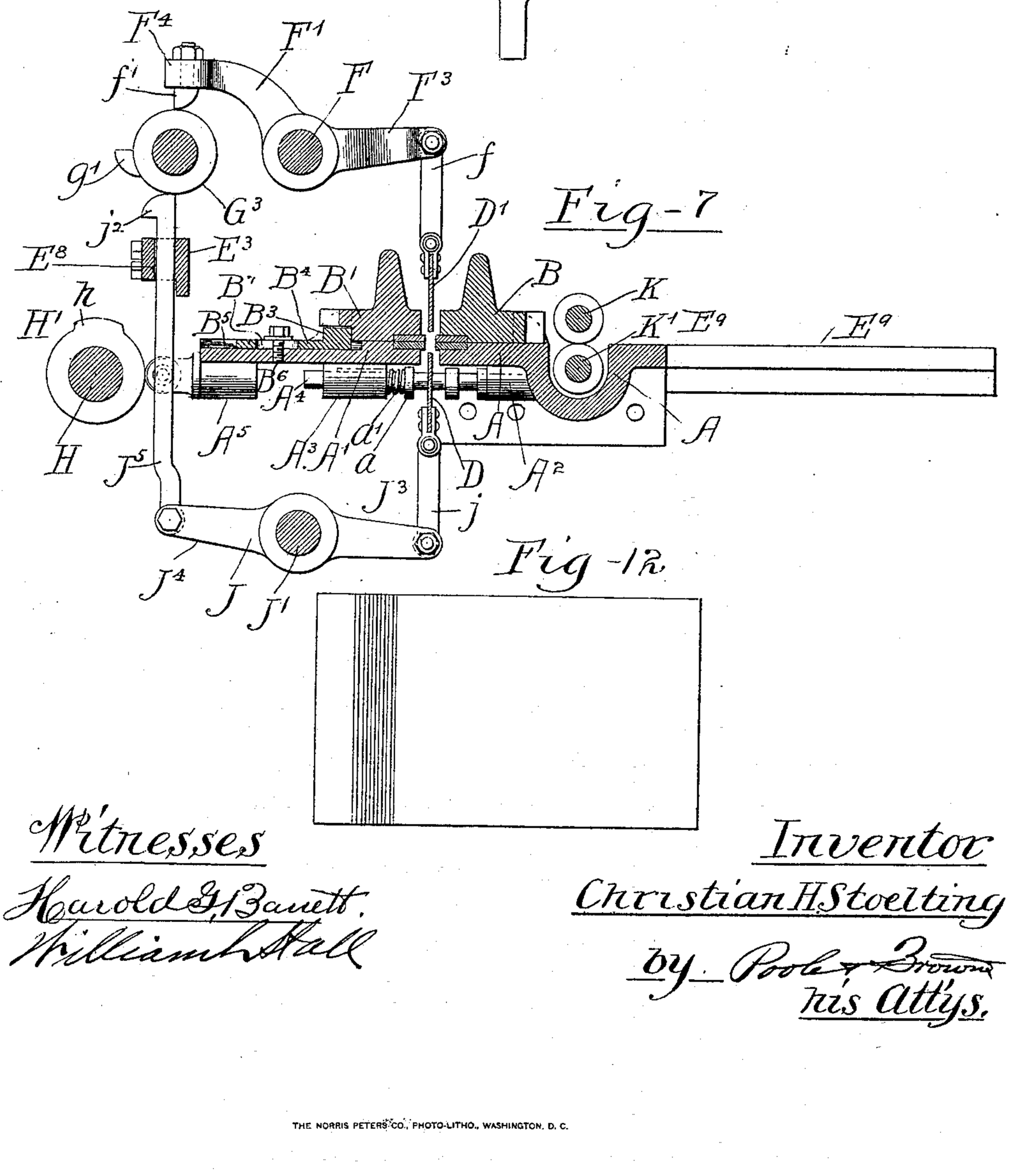
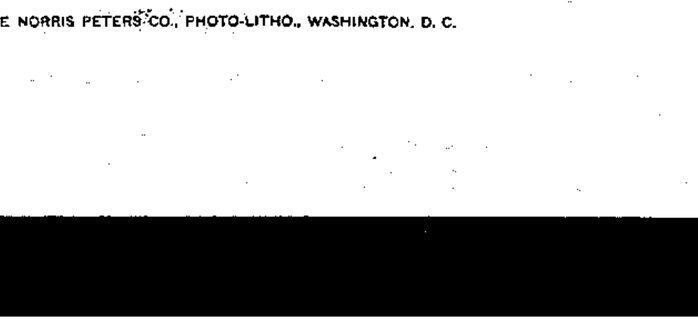


Fig-7

Fig-12.



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(No Model.) 7 Sheets—Sheet 7.

Fig 8

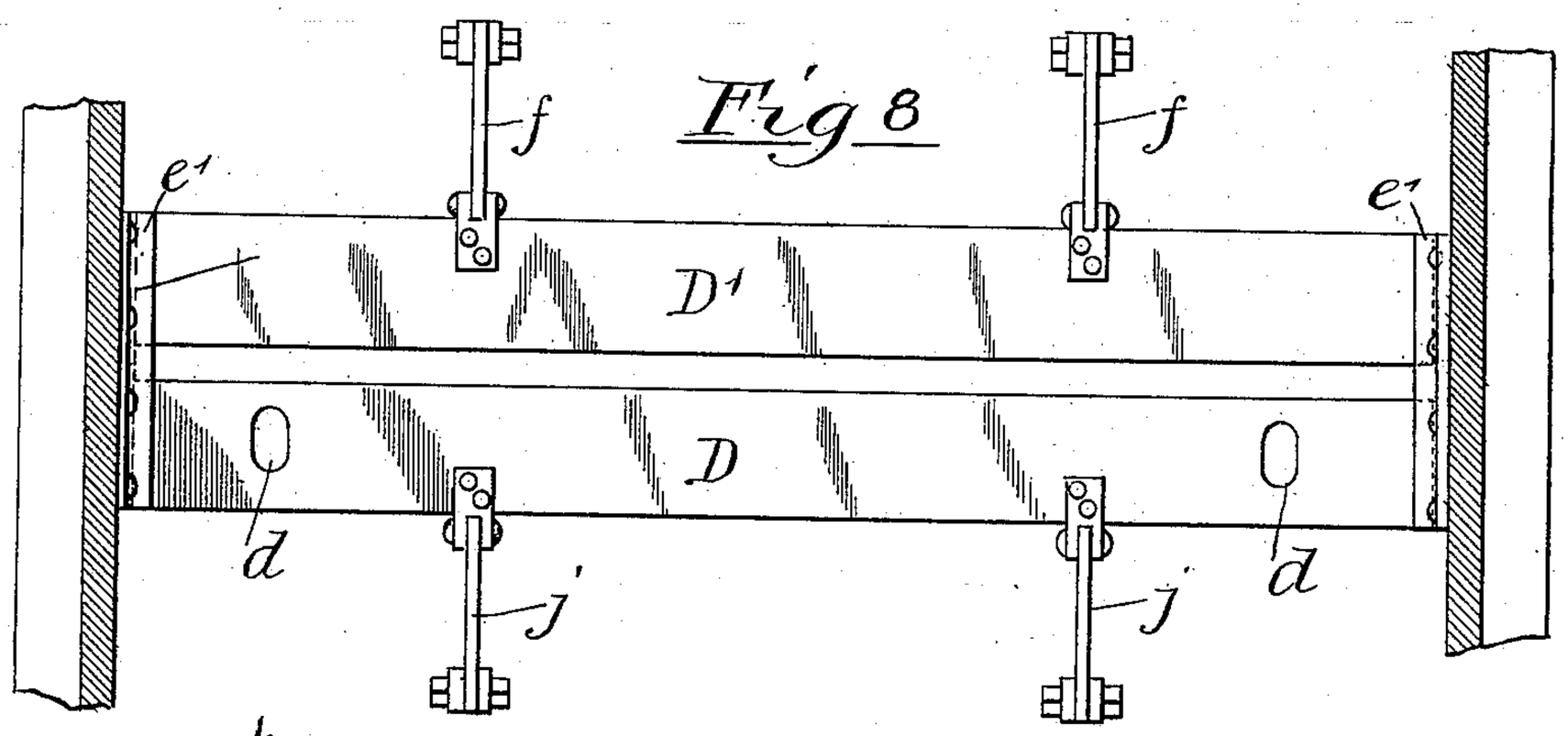
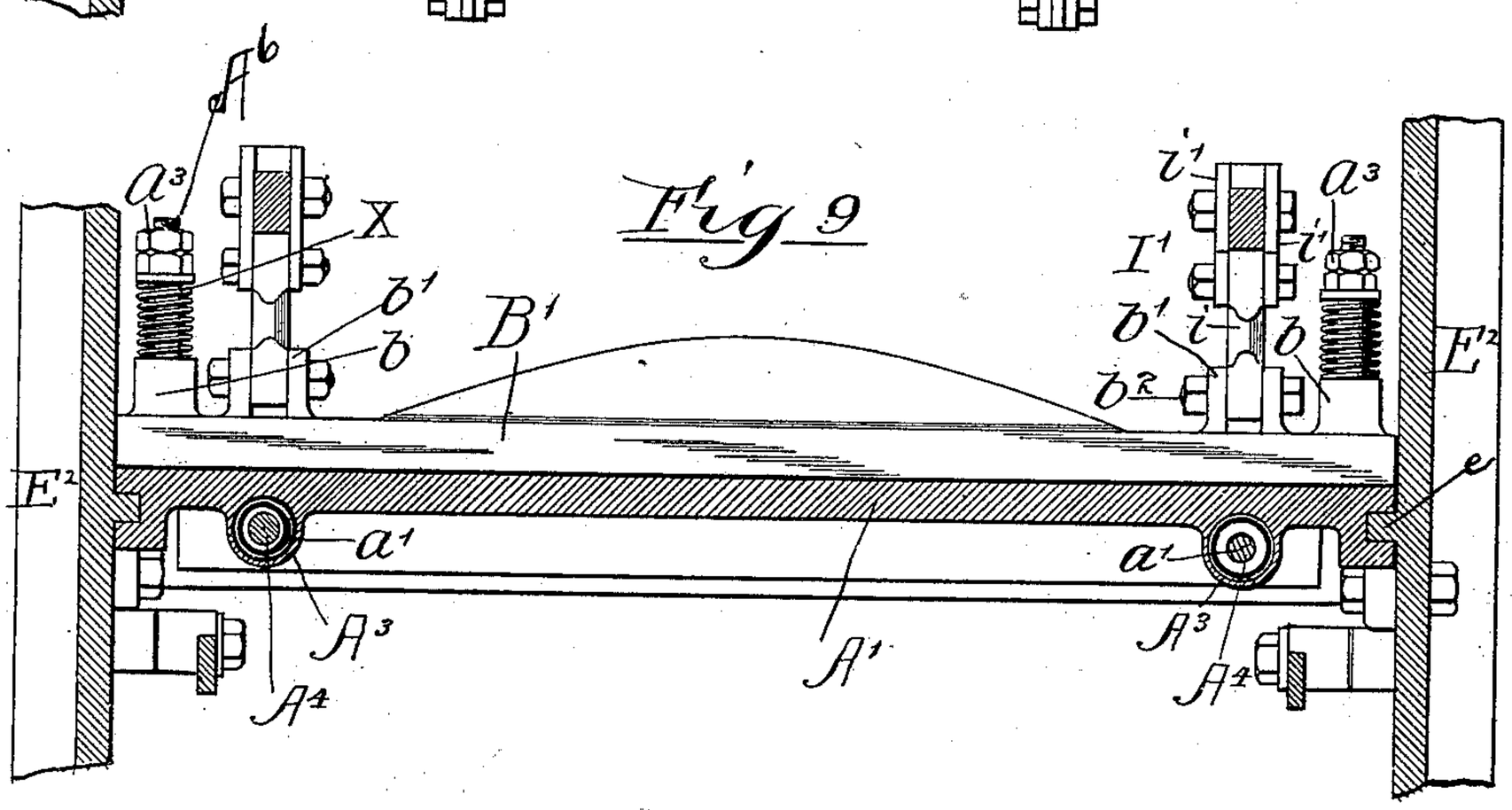


Fig 9



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UNITED STATES PATENT OFFICE.

CHRISTIAN H. STOELTING, OF CHICAGO, ILLINOIS, ASSIGNOR TO WILLIAM A. VAWTER, OF SAME PLACE.

MACHINE FOR CRIMPING PAPER.

SPECIFICATION forming part of Letters Patent No. 622,871, dated April 11, 1899.

Application filed July 6, 1897. Serial No. 643,485. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN H. STOELTING, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Crimping or Bending Sheets of Paper or the Like; 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to machines for creasing or folding sheets of relatively stiff paper or the like for the purpose of imparting to the latter a greater capacity for flexure or bending along the line operated upon.

The machine will usually be employed for creasing or folding sheets of paper for use in books for the purpose of enabling one to produce what is known as a "flat-opening book." Such result has been heretofore attained by some special form of binding; but in those books where the leaves are removable, such as in temporary binders and in loose-leaved ledgers, the separate sheets are usually composite in character, being constructed of the sheet or writing section proper and a binding or relatively narrow back section, which two sections are secured together by a flexible hinge, usually of very thin muslin, linen, or the like, so that when said leaves are secured between the covers of the book or binder along their relatively narrow or back section the thin flexible hinged portion will flex or bend readily when the book is opened, and thus permit the book to be opened out for the ready access to all portions of the section proper of the leaf. This linen or hinge portion of the section is of varying width, there being sometimes as much as an inch or more between the adjacent margins of the two sections of the leaf, and a leaf constructed therewith is necessarily expensive to manufacture because requiring hand labor exclusively. Moreover, it does not contain the maximum capacity for writing—that is to say, the entire part of the leaf and hinge exposed to view when such a book is open cannot be utilized for writing purposes because of this hinge-section. It is therefore desirable to use a sheet of paper as a leaf of such book which shall have a flexible section across it at such distance from its rear margin as to leave a sufficient section or portion of the leaf to be acted upon by the binder or other retaining portion of the book, which section shall not only be flexible and enable the leaf to bend in order to form a flat-opening book, but which may be utilized for the purpose of making records thereon in writing or otherwise the same as upon other portions of the sheet. Several means have been suggested heretofore for producing such flexible section on a sheet of paper, including that of folding or creasing the leaf along a plurality of parallel lines relatively near to each other in such manner that the leaf may be straightened or flattened out after the crease has once been made, and it is the purpose of the present invention to produce a machine for automatically making such creases.

The invention consists, first, in the mechanism for bending the sheet of paper and crimping or setting the bend between coacting jaws.

It consists, second, in the adjustment of the machine whereby the crease or bend in the paper shall be so slight with respect to its writing-surface as to enable one to write with the usual pen and ink or other materials upon the sheet across such crease or bend without having the latter interfere with the appearance or the character of the record made thereon, the crease or bend being at the same time so permanently made as to constitute a freely-movable hinge along the line of the crease.

It consists, third, in suitable mechanism for flattening out the several bends or creases in the sheet after they have been made.

It consists, fourth, in the mechanism for gripping two portions of the sheet between a set of clamping-jaws and means for automatically advancing a knife or tucker blade to start the fold between said gripping-jaws in the right direction preparatory to the bringing of said jaws together for the purpose of making the crimps or folds.

It consists, fifth, in automatically feeding the sheet of paper step by step between each creasing or folding operation a desired dis-

tance, whereby any given number of parallel creases or folds may be given to the sheet.

It consists, sixth, in the mechanism for automatically stopping the machine after a given number of operations.

It consists, seventh, in the various novel devices and combinations of devices herein illustrated and described, together with their mechanical equivalents, and more particularly pointed out in the claims appended hereto.

Figure 1 is a diagrammatic view showing the essential steps in the operation of crimping a sheet. Fig. 2 is a plan view of one form of machine for carrying out the invention. Fig. 3 is a side elevation of the machine. Fig. 4 is a rear elevation of the machine. Fig. 5 is a vertical sectional view of the machine, taken upon the line indicated at 5 5 in Fig. 4. Fig. 6 is an enlarged vertical sectional detail view upon the line 6 6 of Fig. 2, showing the mechanism for operating the upper or vertically-movable jaws as well as for operating the laterally-movable clamping-jaws. Fig. 7 is an enlarged vertical sectional detail view taken upon the line 7 7 of Fig. 2 and illustrating more particularly the knife-blade-actuating mechanism. Fig. 8 is a vertical sectional view taken upon line 8 8 of Fig. 5, showing the knife-blades in elevation. Fig. 9 is a vertical sectional view taken upon the line 9 9 of Fig. 5, showing the frame-actuating mechanism for the laterally-movable gripping-jaws and the means for retracting said jaws to their normal positions. Fig. 10 is a detail view taken on line 10 10 of Fig. 2, showing the upper roller raised. Fig. 11 is a detail view showing the gearing by which the rollers K K are operatively connected. Fig. 12 is a view illustrating the sheet of paper operated upon by this machine. Fig. 13 is a detail sectional view of the adjustable bearing for the shaft H.

Before proceeding to describe the machine in detail with reference to the accompanying drawings I will first describe the operation of crimping as performed by said machine by reference to Fig. 1 of the drawings, which is a diagrammatic view in nine sections or parts, illustrating the successive steps of the machine herein described in crimping a sheet of paper. In this view I have indicated in each nine sections simply the upper and lower clamping-blocks, the upper and lower tucker-blades, and the sheet of paper, the sections being lettered in consecutive order 1^a 1^b 1^c 1^d, &c., as the operation progresses. Referring now to the first section 1^a, A A′ indicate the lower jaws, and B B′ the upper jaws, the jaw A being stationary and the jaw B having a vertical movement to and from the block A, but no movement laterally thereof. The jaws A′ and B′ are each movable, the jaw B′ being movable vertically as the block B is movable and the two jaws A′ B′ being movable laterally to and from the jaws A and B. C is a sheet of paper, *c* being the rear margin thereof, in which it is desired to form a flexible section or hinge, which is made by creasing the same in parallel lines at the points indicated within the brace. (Shown in Fig. 1^a.) D is a lower vertically-movable tucker-blade, and D′ an upper vertically-movable tucker-blade. These same letters will be used throughout the different sections of this diagram. The operation of the machine in this respect is as follows: The tuckers D and D′ and the upper and lower jaws being separated, as indicated at 1^a, the sheet of paper C is fed between the same a proper distance. The vertically-movable jaws B and B′ will now be caused to descend and clamp the sheet firmly upon the jaws A and A′ and the upper blade D′ will be moved downwardly and start the bend of the sheet, as indicated at 1^b. Simultaneously with the completion of this downward movement of the blade D′ the two jaws A′ and B′ will be caused to move laterally toward the jaws A and B, as indicated. As soon as the blade or knife D′ has merely started the bend in the sheet of paper C it is immediately withdrawn, as indicated at 1^c, and the jaws A′ and B′ continue to move toward A and B until they reach the position shown in the diagram 1^d, in which the sheet will be bent or folded in a downwardly-directed fold with creases at c' c^2 c^3. The next operation in the machine will be to retract the jaws A′ B′, as shown in the diagram 1^e, until they are separated to their greatest extent from the jaws A and B and are ready for insertion between them of the lower blade D. The blade D is now caused to move upwardly between the jaws until it comes in contact with and starts an upward bend in the sheet, as indicated in the diagram 1^f, when it is withdrawn, as shown in the diagram 1^g, and the jaws A′ B′ are caused to move laterally toward the blocks A and B, as before. Said movable jaws continue their movement toward the jaws A and B and crimp the sheet, as shown in Diagram 1^h, in the same manner as the sheet was crimped along the line shown in Diagram 1^d, with the exception that in the latter instance the fold in the sheet is downward, or below the horizontal, while in the operation just described it is folded upwardly, or above the horizontal. The jaws A′ and B′ are now retracted laterally, and by the time they have reached their outermost position the jaws B and B′ have been caused to rise, thus releasing the sheet C. Suitable feeding mechanism is provided by means of which the sheet is moved outwardly until the paper is carried a proper distance to the right, as illustrated in Diagram 1^i, at which time the upper jaws B B′ are again moved downwardly to clamp the sheet between the same and the lower pair of jaws, when the operation is repeated as before. This creasing or folding continues until the last crease or bend formed is a predetermined distance from the rear margin of the sheet, thus forming the sheet of paper such as is indicated in Fig. 12 of the drawings.

It is deemed advantageous to bend each fold or crease in two directions, and I therefore provide both the upper and the lower tucker-blades for starting the crimps or folds in the sheet one in one direction and one in the other. I have also arranged to maintain the jaws B B′ closed or clamped upon the jaws A A′ with the sheet C between them during the reciprocating or lateral movement of the jaws A′ B′ against the jaws A and B in order that this double crease, bend, or fold may be given to the sheet before it is fed along the required distance for the next succeeding fold. It may be desirable, however, to go immediately from the operation illustrated in Diagram 1^d to that illustrated in 1^i and then repeat 1^a 1^b 1^c 1^d, as stated.

The machine herein shown is so constructed that one of the vertical sets of jaws A′ and B′ in this instance is movable laterally toward the other jaw; but it will be apparent that this arrangement may be reversed or that both may move a desired distance toward and from each other. With this explanation of the purpose of my invention and of the essential features thereof—to wit, the clamping of the sheet, starting of the bend in the right direction, and then the creasing of the sheet along that bend between the adjacent faces of the crimping-jaws—I will now proceed to describe the machine which I have constructed to embody this invention.

As shown in said drawings, E designates the frame of the machine, comprising side members consisting of legs or standards E′ and horizontal top members E^2, said side members being joined together by upper and lower cross members E^3 E^4 and the standards on each side by intermediate transverse members E^5 E^6. The horizontal top members E^2 are provided with upwardly-extending projections or pillow-blocks E^7, which form a support for a portion of the operative mechanism, as will hereinafter appear.

For convenience of description the upper jaws or blocks B B′ will be designated as the "clamping-jaws" and the jaws A A′ below as the "crimping-jaws," although it will be noted that they will all coact both to clamp the sheet and to crimp it, the clamping action herein referred to being that of engaging and holding the sheets between the jaws in such manner that one set of closed or clamped jaws may be moved toward the other set or both sets moved toward each other to perform the act of folding or creasing. With this in mind it is believed that no confusion will arise from the arbitrary designation of the jaws A A′ as "crimping-jaws" and the jaws B B′ as "clamping-jaws."

The crimping-jaw A is stationary with the machine and may be made integral with the frame E, if found desirable. Said jaw is herein shown as formed on the rear portion of a casting which constitutes a part of the feeding-table, as will hereinafter more fully appear. It will be understood that the jaws extend the entire distance between the side members of the frame. The coacting crimping-jaw A′ is mounted so as to be laterally movable with relation to the jaw A, but has no vertical movement. Said jaw A′ is in the present instance supported between the upper horizontal members E^2 of the frame by means of integral tongues *e* on said frame, which engage grooves in the adjacent edges of the jaw A′. The upper faces of the jaws A A′ lie in the same horizontal plane. The movable crimping-jaw A′ is adapted to be normally held retracted from the jaw A to allow a space between the same for the passage of the tucker-blades D D′. The means herein shown for holding such jaw in its retracted position are as follows:

A^2 A^2 designate hollow cylindric bosses mounted on the lower side of the jaw A, on each side thereof, adjacent to the frame members E^2. A^3 A^3 designate a second set of hollow cylindric bosses mounted on the under side of the jaw A′, with the bores thereof in alinement with the bores of said bosses A^2. A^4 A^4 designate short guide-rods mounted in said bosses A^2 A^3, the forward end of said rods with relation to the machine being mounted rigidly within the bosses A^2 and the rear ends thereof having sliding engagement with the bosses A^3, as seen in Fig. 7 of the drawings. The rods A^4 are of less diameter than the bores within the bosses A^3 and are provided adjacent to the forward end of said bosses with rigid collars *a*, between which and opposing shoulders in said bosses A^3 are interposed spiral expansion-springs *a′* *a′*. With this construction it will be seen that when the jaw A′ is moved toward the jaw A in the act of crimping it will be moved against the action of the springs *a′*. When the jaw is released, therefore, said springs will act to return the same to its rearmost position, as seen in Figs. 5, 6, and 7.

Any suitable means may be employed for moving the jaw A′ inwardly upon the jaw A. As herein shown, said jaw is provided on each side thereof adjacent to the frame member E^2 with tappet-blocks A^5, mounted on the lower surface of the jaw. Said tappet-blocks are adapted to be engaged by cam-surfaces *h*, formed on sleeves H′, mounted rigidly on a transverse shaft H, which is journaled in the opposite horizontal frame members E^2 of the frame E. Said cam-surfaces are arranged to cause inward movement of the jaw A′ in each rotation of the shaft H. The shaft H, which may be called the "crimping-shaft," extends outwardly beyond the frame E on the left-hand side of the machine, as shown in Figs. 3 and 4, and is provided on the outside of said frame with a gear-wheel H^2. Said gear-wheel is engaged by and receives motion from a smaller gear-wheel M′, mounted upon a driving-shaft M and adjacent to the outer end thereof, said shaft M being provided on its opposite end outside of the frame E with a belt-pulley M^2, by means of which the shaft

may receive motion from any suitable source of power.

The bearings within which the shaft H is journaled are herein shown as made adjustable to permit the movement of said shaft toward and from the jaw. The frame members are provided with recesses, within which are mounted two-part bearing-blocks H^2 H^3, which are recessed in their adjacent faces to form a suitable bearing for said shaft. The part H^3 of the block is provided in its outer end with flanges h^2, through which pass securing-bolts H^4, which are mounted in any convenient manner in the frame members E'. Locking-nuts h^3 have screw-threaded engagement with the outer ends of the bolts which serve to hold the bearing-blocks and shaft in place in the frame. Between the inner ends of the blocks H^2 and adjacent inner ends of the recesses are mounted buffers H^5, which permit the necessary movement of said bearing-blocks within the recess in the adjustment of said shaft. A coiled expansion-spring would obviously serve the same purpose and might be used instead of the buffer, if desired.

The movable crimping-jaw A' is provided on its upper surface, adjacent to the forward edge thereof, with an adjustable stop, which limits the movement of the sheet of paper when it is inserted between the clamping-jaws. Said stop consists of a transverse bar B^3, mounted parallel with the adjacent edge of the jaw, and two rearwardly-extending arms B^4 B^4, attached to said bar B^3 adjacent to its opposite end, and adapted to be secured to the upper face of the jaw in any convenient manner. As herein shown, the upper face of said jaw is provided with grooves B^5 B^5, within which said arms B^4 rest and slide. Said stops are secured in place upon the jaw by means of set-screws B^6 B^6, which pass through the arms B^4 and have screw-threaded engagement with the jaw. In order to provide movement of the stop on the jaw, by means of which the width of the margin of the sheet may be regulated, said set-screws engage elongated slots B^7 B^7 in the arms B^4. The middle portion of the adjacent jaw B' is cut away on its under side to receive the bar B^3 when said bar is at the limit of its movement. With this construction the width of the margin of the sheet between the crimped section and the rear edge thereof may be regulated as desired. A single arm B^4 may be employed to hold the bar B^3 in place instead of two, as shown.

The upper jaws B B' are shown in plan view in Fig. 2 and in cross-section in Figs. 5, 6, and 7. Each of said jaws is so mounted as to have vertical movement with relation to the jaws A A', and the rear jaw B' is mounted so that it may be retracted from the jaw B when the lower jaw A' is retracted under the action of the spring a', as described. Said jaws, as in the case of the jaws A A', extend the entire distance between the upper frame members E^2, but in the construction shown need not be engaged therewith. In order to provide against lateral movement of said jaws B B' with relation to the jaws A A' said first-mentioned jaws are provided on each end thereof with apertures through which extend upwardly-projecting guide-rods A^6, which are rigidly secured at their lower ends in the lower jaws A A'. Said upper jaws are provided on their upper sides with bosses b, through which the guide-rods A^6 pass, to afford a more substantial bearing for the same. In order that the jaws B B' may be promptly returned to their lower or clamping position when they have been raised sufficiently to allow a sheet of paper to be passed thereunder, spiral expansion-springs X are herein shown as interposed between the upper ends of the bosses b and nuts a^3 on the upper ends of the guide-rods A^6. With this construction the jaws B B' will be lifted against the force of the springs, and when released will be returned to their lower or clamping position thereby in an obvious manner. Said nuts a^3 are made adjustable to permit the tension of the springs X to be regulated and the jaws B B' held upon the jaws A A' with varying force. Means for raising said jaws B B' to permit a sheet of paper to be passed thereunder are provided as follows:

I I designate two arms or levers pivoted between their ends upon a transverse shaft F, which is non-rotatively mounted between the pillow-blocks E^7 of the frame. To the outer or forward ends of said arms are pivoted connecting-links I', comprising parallel side members i and cross-heads i', the lower ends of said side members being pivotally engaged with lugs b' on the upper faces of the jaws B B' by means of pivot pins or bolts. The jaws B B', with which the parallel members of the link are engaged, have lateral movement with relation to each other, and said side members of the link are herein shown as pivotally connected with the cross-head i' by means of pivot-bolts i^2, by which the lower ends of said side members may be oscillated when the jaw B' is retracted from the jaw B. This construction also permits said jaws to be raised vertically upward without friction upon the guide-rods A^6 when the rear end of the lever is depressed. When the arms or levers I have been connected with the jaws B B' in the manner described, said jaws will be raised from the jaws A A' by depressing the rear or free end of said lever I in any convenient manner. This is in this instance accomplished by means of cams g, herein shown as formed on sleeves G', mounted adjacent to each end of a transverse shaft G, which is rotatively mounted between the rear sides of the pillow-blocks E^7. When said shaft is rotated, therefore, the cams g will act to depress the free ends of the levers I, and thereby raise the jaws B B'. When said cams release the lever, the springs X will act to promptly return the same to their lower position, as shown in the figures of the drawings. Said shaft G is provided near one end

thereof, outside of the frame E, with a gear-wheel G^2, which intermeshes with and receives motion from a smaller gear-wheel H^6, which is mounted on the shaft H outside of the gear-wheel H^2 above mentioned. In order to obviate friction between the free end of the arm I and the sleeve G, said arm is shown as provided with an antifriction-roller I^2.

The upper blade D′ is supported upon and actuated by a lever F′, which is mounted between its ends upon the shaft F, between said levers or arms I, just described. Said lever F′ comprises a sleeve F^2, which is rotatively mounted upon the shaft, to which are attached forwardly-extending divergent arms F^3 and a rearwardly-extending arm F^4, located upon the sleeve centrally of the arms F^3. Connecting-links *f* are pivotally attached to the forward ends of the arms F^3, to the lower ends of which is pivotally secured the tucker-blade D′, as clearly seen in Figs. 7 and 8. Said lever F′ is so arranged that when in the position shown in Fig. 7 of the drawings the tucker-blade D′ will be at the upper limit of its movement. To move said blade downwardly to crimp the paper between the adjacent jaws, it is necessary that the rear or free end of the arm be raised. For this purpose the lever F′ is provided on its rear end with a tappet-surface *f′*, which is adapted to be engaged by a cam *g′* on a sleeve G^3, mounted on the shaft G. With this construction when the shaft is rotated so that the surface *g′* engages the tappet-surface *f′* on the arm F^1 the lever will be oscillated and the blade attached thereto will be lowered between the two sets of jaws and the paper clamped between the same folded downwardly, as before described. The inner faces of the frame are provided with guide-blocks *e′*, Figs. 2 and 8, which are provided with vertical grooves with which the opposite ends of the blade D′ have engagement and by which they are held from lateral movement. The rear arm F^4 of the lever may be made of sufficient weight to promptly return the blade to its upper position when the cam *g′* leaves the tappet-surface *f′* thereon. I prefer, however, that this movement be positively accomplished and have herein shown for this purpose a spiral spring F^5, mounted upon the shaft F, one end of which is engaged with a collar F^6 on the shaft and the other end of which is engaged with an arm F^7, extending rearwardly from the sleeve F^2. The spring is so arranged that the lever is oscillated against the action thereof, and when released the torsional action of the spring will act promptly to return the lever to its normal position and raise the blade upwardly. Said collar F^6 is adjustably mounted on the shaft and may be moved thereon to regulate the tension of the spring as desired.

The lower tucker-blade D is mounted so as to be moved upwardly between the crimping-jaws, and thereby crimp or fold the paper upwardly, as seen at I′, Fig. 1. Said blade is mounted upon and actuated by a lever J, which is pivoted between its ends upon a transverse shaft J′ vertically below the shaft F and mounted in the opposite sides of the frame. Said lever is of the same form as the lever F′ above described, comprising a sleeve J^2, to which are attached forwardly-extending divergent arms J^3 and a rearwardly-extending arm J^4, located upon the sleeve centrally between the arms J^3. To the forward ends of the arms J^3 are pivotally attached connecting-links *j*, the upper ends of which engage the lower blade D. As herein shown, the blade is provided with slots *d*, through which pass the guide-rods A^4, as clearly seen in Fig. 5. Said slots *d* are made of sufficient length to provide for the necessary upward movement of the blade and serve also to support said blade in its lower position. The blade is actuated to move upwardly between the crimping-jaws by depressing the rear end of the arm J^4 of the lever J, thereby raising the arms J^3 and the blade thereto attached. In the present instance this is accomplished by the same shaft by which the upper blade is moved downwardly, as heretofore described. As shown, the rear end of the arm J^4 of the lever J is provided with a pivotally-engaged actuating-bar J^5, which extends upwardly with its extreme upper end adjacent to the sleeve G^3. The upper end of said arm is provided with a tappet-surface j^2, which is adapted to be engaged by the cam *g′* of said sleeve G^3, through the medium of which the rear end of the lever is depressed and the blade D, attached thereto, raised into its operative position. Said actuating-bar J^5 is shown in Figs. 4 and 5 as passing through a suitable bearing E^8 in the transverse bar E^3 of the frame, by means of which the upper end thereof is held in engagement with the sleeve G^3. Said lever J is engaged by a spring J^6, which is interposed between the sleeve J^2 thereof and a collar J^7 on the shaft and which acts to positively return the knife to its lower position, as in the construction of the spring F^5 above described. Said collar J^7 is also adjustably mounted upon the shaft and serves by moving the same upon the shaft to regulate the tension of the spring as desired.

The apparatus herein shown and described is designed for crimping or folding a sheet of paper both upwardly and downwardly, as shown in the diagrammatic view of Fig. 1. It will be seen, therefore, that the cam *g′* operates both tucker-blades D D′ to move in opposite directions to start the fold on each side of the paper during one rotation of the shaft G and that as each fold is crimped immediately after being started by the blade the shaft H, actuating the movable crimping-jaw A′, rotates twice while the shaft G passes through one rotation. The gear-wheels G^2 and H^6 are therefore of such size and the cams *g* and *h* are arranged at such angular distance apart on their respective shafts that the crimping-jaw A′ will be moved inwardly

at the instant each blade is moving toward and touching to start the fold in the paper, the blade of course being rapidly retracted out of the way of the crimping-jaws as soon as the fold is started in the desired direction. If it be desirable to crimp the paper in but one direction, it will only be necessary to remove one of the tucker-blades and its actuating mechanism and change the size of the gear-wheels H^6 and G^2, the angular relation of the cam-surfaces remaining the same in either case.

As herein shown, the jaws A A′ B B′ do not come in contact with each other when the sheet of paper is crimped between the same, but are provided on their under surfaces with projecting faces a^2 a^3 b^2 b^3, which are arranged to coact with each other in the vertical and lateral movements of the jaws. Said faces are preferably of steel and, as stated, project beyond the adjacent inner surfaces of the jaws, so that when they are in contact with each other a space is left between the body of said jaws within which the tucker-blades D D′ may rest. It will be unnecessary, therefore, that the knives be moved beyond the upper and lower planes of the jaws, but only sufficient to clear the said steel faces. Said faces a^2 a^3 b^2 b^3 are shown as made separate from the jaws, but may be formed integral therewith, if desired.

Said frame E is provided in front of the tucker-blades D D′ with a feed-table E^9. Said table is mounted upon forward extensions E^{10} of the upper horizontal bar E^2 of the frame, which are supported from the standards E′ of the frame by obliquely-arranged braces E^{11}. Said braces E^{11} and horizontal supporting-braces E^{10} may be cast integral with the frame E, if desired, and the table E^9 may be made of any suitable material and secured to the frame in any convenient manner.

Between the outer edge of the table and the tucker-blades D D′ are arranged a pair of feed-rollers K K′. In the present instance the casting forming the stationary crimping-jaw A is extended forwardly to slightly beyond the standards E′ of the frame, at which point it is connected with the table E^9. The upper surface of the table and the casting forming the jaw A lie in the same horizontal plane, so that the forward portion of said casting forms the rear margin of the feed-table. The lower roller K′ is mounted in a depression or groove in the forward part of the casting forming the jaw A, so that the upper surface thereof lies in the horizontal plane of the table. Said roller is rotatively mounted at its opposite ends in the opposite side members of the frame. The upper roller K is mounted above said roller K′ to coact therewith, but in such manner that it may be raised vertically therefrom, so that the sheet of paper may be thrust between the same and between the upper and lower sets of jaws when the said jaws are raised in the manner heretofore described. As herein shown, said roller is mounted at each end in a movable journal-block K^2, which block is mounted between upwardly-extending parallel guides E^{12}, secured upon the upper surface of the casting forming the stationary jaw A. With this construction the upper roller K may be raised from the roller K′ to permit a sheet of paper to be inserted between the same and between the clamping-jaws, it being understood that the sheet will be inserted at once between said jaws in such manner that the first crimp made therein will be that adjacent to the front margin thereof, from whence the sheet will be fed forward until the crimped section of the sheet extends to a predetermined distance from the rear margin of the same. The upper roller K is shown in the drawings as in its lower or operative position, but is so mounted that it will normally stand retracted from the roller K′, as will hereinafter appear. The means for actuating said roller to bring it into its operative position are as follows:

The coacting portions of the rollers do not extend the full distance between the side members of the frame E, as clearly shown in Fig. 2 of the drawings, but are provided on each end with short shaft-sections which form the journals upon which the rollers turn. Upon the shaft, between the coacting portion of the roller K and the side members of the frame, are mounted bearing-links K^3. Said links K^3 pass downwardly through openings in the casting upon which the stationary jaw is formed adjacent to each end thereof and are provided with slots *k*, adapted to receive the shaft of the roller K′, by means of which said links are moved upon the shaft of the roller K′ when they are moved to raise the upper roller K. To the lower end of said links K are pivotally attached the forward ends of levers K^4, the rear ends of said levers being pivotally connected with the frame by means of inwardly-projecting studs e^2. (Shown in Figs. 4 and 5 of the drawings.) Vertically-extending connecting-rods K^5 are pivotally attached to the levers or arms K^4 adjacent to their points of connection with the links K^3, and said connecting-rods are pivoted at their lower ends to the outer ends of arms K^6, which are rigidly attached at their rear ends to a rock-shaft e^3, rotatively mounted between the frame members E^5, as seen in Fig. 5 of the drawings. Said rock-shaft e^3 is provided between the arms K^6 with a forwardly-extending arm K^7, to the outer end of which is attached a downwardly-extending connecting-rod K^8, which is in turn pivotally attached at its lower end between the ends of a treadle arm or lever K^9. Said treadle-arm is pivoted between its ends upon a transverse shaft e^4, extending between the lower transverse members E^6 of the frame. The outer end of said treadle-arm is provided with a foot-rest K^{10}, which is adapted to be engaged by the foot of the operator when it is desired to actuate the upper roller. As before stated, the upper roller will normally be held as shown in

Fig. 11, in which position sheets of paper may be readily inserted beneath it and in position for crimping. When it is desired to have the surface thereof coact with the surface of the roller K′ to feed the paper between the same, said roller K will be lowered by depressing the outer or free end of the treadle-arm K^9 in an obvious manner. Any suitable means may be employed to maintain the roller K in its normally-elevated position. A preferred form of such means will be hereinafter described. Means for actuating said rollers to feed the paper between the same are provided, as follows:

The upper roller K is provided on one end thereof, at the left hand, as herein shown, outside of the frame E^2, with a ratchet-pinion L, Figs. 2 and 3, said wheel being rigidly secured to the shaft of the roller: L′ designates a radially-extending arm pivotally mounted on the shaft of said roller K outside of said ratchet-wheel L. Said arm L′ is provided adjacent to its outer end with a gravity-pawl L^2, adapted to engage the teeth of the ratchet-wheel L. Said pawl is herein shown as directed inwardly from the arm L′ and adapted to engage the teeth of the wheel L between the arm and the tucker-blades D D′. With this construction when the arm L′ is oscillated toward the knives the pawl will act to turn the ratchet-wheel and attached roller K inwardly, and thus move the sheet of paper between said roller K and the lower roller K′ outwardly away from the tucker-blades. The means for automatically oscillating said roller K as the sheet is crimped is as follows:

L^3 designates an actuating-bar which is pivotally engaged at one end with the arm L′ and has endwise-sliding engagement at its opposite end with the pillow-block E^7 of the frame. In the present instance said bar L^3 is provided, on its end thereof adjacent said block, with an elongated slot which is adapted to engage an outwardly-extending stud e^5 in said block, said connection being such that the bar L^3 may have free longitudinal movement thereon. Upon the shaft G, inside of the gear-wheel G^2, is formed a cam g^2, so arranged as to engage the adjacent end of the actuating-bar L^3 once during each rotation of the shaft and which acts to move said bar outwardly and to thereby oscillate the outer end of the arm L′, which is connected with the bar away from the tucker-blades D D′. To the outer end of the arm L′ is attached a spiral contractile spring L^4, the opposite end of which is attached to an outwardly-projecting stud e^6 on the pillow-block E^7 of the frame. Said spring acts to restore the outer end of the arm L′ to a vertical position after it has been oscillated by engagement of the cam with the inner end of the actuating-bar, as herein described, and by reason of the engagement of the pawl with the ratchet-wheel, as shown, the spring will act to turn said ratchet-wheel and attached roller K inwardly in the manner before described. Any suitable means may be employed for attaching the outer end of the connecting-rod L^3 with the radial arm L′. As herein shown, said arm is provided on its outer face with a T-slot *l*, within which is adapted to rest and slide a correspondingly-shaped pivot-stud *l*′, with which the outer end of the actuating-bar L^3 is pivotally engaged. Said stud will be adjustably secured to the arm L′ in any suitable manner. When the stud is moved upwardly or downwardly in the slot *l*, the throw of the arm L′ will be decreased or increased and the length of the feed of the paper between the rollers K K′ correspondingly changed.

The ends of the shafts opposite the parts just described are operatively connected together by means whereby the upper roller is given a positive rotary motion in the desired direction and at the desired speed. The details of such mechanism are shown in Figs. 2 and 11. In said figures, k^4 designates a gear-wheel mounted on the shaft of the roller K, and k^5 a gear-wheel mounted on the shaft of the roller K′. Said wheels are adapted to mesh with each other when the roller K is in its lower position, but are moved out of contact with each other when said roller is lifted. Said wheels are maintained in constant operative relation by means of two intermediate gears k^6 k^7, mounted on short shafts k^8 k^9, which latter are mounted between side plates or links k^{10}. Said gears k^6 k^7 mesh with each other and with the gears k^4 k^5 and are connected with the latter by means of side plates or links k^{11}, mounted at their opposite ends upon the shafts k^8 k^9 and the shafts of the rollers K K′. The upper link k^{11}, or that engaging the shaft of the roller K, is pivotally mounted upon the shaft k^9, so that the outer end thereof may swing upwardly to permit upward movement of the attached roller K.

The machine thus far described is operative to crimp sheets of paper in the manner hereinbefore set forth. The tucker-blades will each act to start the fold or crease in the paper once in each direction during each revolution of the shaft G. The movable crimping-jaw will act to crimp each fold. The clamping-jaws will be raised once during each revolution of the shaft G, and said shaft will act through the cam-surface g^2 to actuate the rollers K K′ to advance the sheet between the jaws. When the clamping-jaw B descends upon the jaw A after a crease or fold has been formed and the sheet is fed along for the next fold or crease, the sheet is flattened out along the line of the crease or bend just made. This is repeated as to each crease or fold except the last one, and the sheet is taken out of the machine, therefore, with a practically smooth surface, although having a plurality of parallel creases or folds. I may also time the forward movement of the roller K so as to cause the sheet to pass out of the machine between the rollers K and K′, whereby the sheet will be flattened out by said rollers.

The sheet of paper in Fig. 12 is shown as provided with ten creases or folds, and the machine herein shown will be considered as designed for crimping a sheet in such manner in one continuous operation thereof. The machine may of course be set to produce any greater or less number of folds or creases desired; but in any case it is desirable that the machine may be automatically stopped when the predetermined number of creases or folds have been produced. To accomplish this result mechanism is provided, as follows:

M^3 designates a pulley mounted rigidly on the shaft M and, as herein shown, on the end thereof adjacent to the gear-wheel M'.

N designates a friction-brake comprising two jaws N' N', which are divergently curved at one end thereof to embrace the pulley M^3, as more clearly shown in Fig. 5 of the drawings. Said arms are pivoted at their lower ends upon a stud E^{13}, extending inwardly from the frame E, adjacent to the pulley M^3, and are adapted to oscillate toward and from each other in a vertical plane. The parts of said arms adjacent to the pivotal point of connection with the stud E^{13} are provided with an aperture which extends from front to rear of the machine, and within said aperture is arranged a clamping bolt or pin *n*, provided on one end with a shoulder, herein shown as formed by locking-nuts *n'*, and is engaged at its other end with a lever N^2, which is arranged with its fulcrum on the arm N' of the clutch opposite that with which the nuts *n'* are engaged. Said lever acts, in connection with the pin *n*, when the lower end thereof is oscillated away from the pulley, to draw the arms of the brake together and clamp them upon the pulley m^3. The lower ends of the jaws N' are provided on opposite sides thereof with bearing-blocks n^2, which may be made integral therewith or not, as desired, and with which the nuts *n'* and lever N^2 are engaged. Said lever is herein shown as provided with an inturned end portion n^3, the extreme inner end of which engages the adjacent bearing-block n^2 and forms the fulcrum of the lever. With this construction the point of fulcrum on the bearing-block n^2 moves downwardly as the lower end of the lever is moved outwardly away from the pulley, so that the point of application of power of the clamping-pin *n* remains in the same horizontal plane. The upper or bent end portion of the lever N^2 is bifurcated, and between the arms thereof the outer end of the clamping-pin *n* rests and is secured therein by means of a pivot-bolt n^4.

N^3 designates a spring which engages at one end the lower end of the lever N^2 and is attached at its other end to the frame, by means of which the lever is returned to its normal or non-clamping position when released.

O designates a shaft rotatably mounted below the shaft M and slightly in the rear thereof. Said shaft is provided on its outer end with a large gear-wheel O', which intermeshes with and receives motion from a small gear-pinion P', mounted upon a sleeve P, which is rotatively mounted upon a stud P^2, extending outwardly from the frame E above and in front of the shaft O, said sleeve P being provided outside of the wheel P' with a second gear-wheel P^3, which intermeshes with and receives motion from a gear-wheel M^4 on the outer end of the main shaft M. It will thus be seen that the connection between said main shaft M and the shaft O is such that said shaft O will be caused to rotate very slowly with relation to the main shaft. Said shaft O is provided adjacent to the lever N^2 with a sleeve O^2, on which is formed a cam *o*, as shown in Fig. 5 of the drawings. Said cam, as herein shown, rotates from right to left and engages the lever N^2 to gradually force the lower end thereof rearwardly, and thereby tighten the brake N upon the pulley M^3, which gradually stops the rotation of the shaft M and the movement of the parts of the machine connected therewith. The shaft O, carrying the cam *o*, rotates very slowly with relation to the driving-shaft M, and said cam acts to gradually retard the movement of the shaft and the parts connected therewith. Said parts are so arranged that when the cam is exerting its greatest power upon the lever, or is in that position in which a line passing through the same and the center of the shaft extends at right angles to the lever N^2, said lever will act with such force upon the brake N as to positively stop the movement of the shaft M and the parts operatively connected therewith.

The shaft M is provided on its outer end adjacent to the driving-pulley M^2 with a friction-clutch M^5, by means of which said pulley M^2 is connected with the shaft M in the usual manner. As the shaft M is stopped gradually by the friction-brake N the clutch is so mounted upon the shaft as to permit it to slip somewhat thereon when said brake N is set upon the pulley M^3. Said clutch is adapted to be disconnected from the shaft at a time slightly in advance of the moment when the lever N^2 is exerting its greatest power upon the brake N to stop said pulley M^3 and shaft M, connected therewith. Said clutch is actuated by means of a lever Q, which is engaged at one end with an annular groove in the clutch and is pivoted between its ends upon a bracket Q', extending outwardly from the frame of the machine. The lever Q is engaged at its lower end with a spring Q^3, which is attached to the frame of the machine and which acts through said lever to normally hold said clutch out of engagement with the pulley M^2. Said clutch is held positively in its operative position, or that in which it acts to connect the pulley M^2 with the shaft M, by means of an actuating-bar Q^2, connected with the lever Q below its point of pivotal attachment with

the bracket Q′ and adapted to be engaged at its opposite end with a suitable guide-surface upon the shaft O. Said guide-surface is so formed as to hold the bar and connected lever in their outermost positions during the greater part of the rotation of said shaft; but at a given time in the rotation thereof it permits said bar to move endwise toward the guide-surface, and thereby allows the lever Q under the action of the spring Q^3 to be oscillated to move the clutch M^5 out of engagement with the pulley M^2. Said guide-surface in this instance consists of a segment mounted upon the shaft O adjacent to the cam-sleeve O^2. Said segment, as herein shown, is made in the form of a pulley S, provided in its periphery with a recess S′, within which is adapted to enter at a given time in the rotation thereof the adjacent end of the actuating-bar Q^2. The cam *o* of the sleeve O^2 and the recess S′ in the pulley are so arranged upon the shaft that said recess will be moved into the plane of the bar Q^2 just before the cam *o* is exerting its most effective power through the lever N^2 upon the friction-brake N, so that at the instant the actuating-bar enters the said recess of the pulley and permits the lever to oscillate and actuate the clutch to disconnect the pulley M^2 from the shaft M the brake mechanism will act to positively stop the movement of the shaft M and the parts of the machinery operatively connected therewith. The recess S′ is made slightly wider than the thickness of said actuating-bar Q^2, and the peripheral speed of the pulley S is such that the brake will act to entirely stop the machine before the bar Q^2 comes in contact with the sides of the recess. With this arrangement no strain whatever comes upon said bar when stopping the machine. The inner end of the bar Q^2 is provided with an antifriction-roller Q^4, by which friction between the same and the pulley is obviated in the rotation of said pulley.

The clutch will be held in its retracted position by the spring Q^3 and will be moved inwardly against the action of said spring to connect the pulley with the shaft when the actuating-bar Q^2 is disengaged from the recess in the pulley S. Said actuating-bar is herein shown as connected with the rear end of the treadle-arm K^9 in such manner that when the forward end of said arm is depressed the bar will be withdrawn from the recess S′ and the clutch moved to connect the pulley with the shaft M′, as before described. The actuating-bar Q^2 is connected with the rear end of the treadle-arm K^9 by means of a bell-crank lever R, pivoted at its angle upon a bracket R′, which projects inwardly from the frame E. The arm of said bell-crank lever adjacent to the treadle-arm is operatively connected therewith by means of a connecting-link R^2, and the opposite arm of the lever is operatively connected with the bar Q^2, as shown in Fig. 4. Said bell-crank lever R is so arranged that when the actuating-bar connected therewith is in its innermost position or engaged with the recess S′ of the pulley S the rear end of the treadle-arm K^9 will be depressed and the outer end thereof elevated, at which time, as before stated, the clutch will be disengaged from the pulley M^2. When, therefore, the forward end of the treadle-arm K^9 is depressed, it will act through the connecting-link R^2 and bell-crank lever R to withdraw the actuating-bar from engagement with the pulley S and to oscillate the lever Q to move the clutch into engagement with the driving-pulley. With this arrangement it will be seen that the spring Q^3 tends, through the connection described, to normally depress the rear end of the treadle-arm K^9 and raise the forward end thereof, which will, through its connections with the roller K, act to raise said roller away from the roller K′. Said treadle-arm therefore serves the double purpose of actuating the roller K to move it into its operative position with the roller K′ and to operate the mechanism by which power is connected with the machine. As the movement required to lower the roller K is less than that necessary to move the clutch M^5, through its connection with the lever, into its operative position, the lower end of the connecting-rod K^8 is shown as provided with a slot *k*′, within which the pivot-bolt k^2 rests, by means of which said lever K^9 may have vertical movement with relation to the connecting-rod K^8. When the clutch M^5 is disconnected from the power-pulley M^2, as before stated, and the free end of the lever is in its raised position, the bolt k^2 will engage the upper end of the slot *k*′. Said slot *k*′ therefore allows the arm K^9 to be depressed some distance when the clutch is being moved into its operative position before the connections between the treadle-arm and roller K are actuated to move the same roller downwardly. Said connecting-rod is provided in its portion containing the slot with an adjusting-plate k^3, by which the length of the slot engaged by the pivot-bolt k^2 may be varied as desired to correspond with varying sizes of the roller K and other modifying conditions. When the outer or free end of the treadle-arm K^9 is depressed to connect the friction-clutch M^5 with the pulley M^2, said action will withdraw the actuating-bar Q^2 from the recess S′ of the pulley and the machine will be free to be operated under the action of the applied power until the pulley has completed another rotation, when the brake will operate to stop the machine, at which time the bar will enter the recess in said pulley and permit the lever Q to oscillate to disengage the clutch from the pulley M^2.

The construction and arrangement of the operative parts of the machine are such that the stop G will stop with the cam *g* thereon in engagement with the adjacent end of the lever I, by means of which the clamping-jaws B B′ will always be in their raised position when the machine is not in operation, and

the sheets of paper may therefore be readily inserted into and withdrawn therefrom.

The operation of the machine will be readily understood from the foregoing description. As stated, when the machine is not in operation the clamping-jaws B B′ and the roller K are in their upper position, and a sheet of paper may be readily inserted thereunder. The sheet of paper is moved inwardly until it engages the stops B^3, which have previously been adjusted to produce the width of margin desired. The operator now depresses the forward end of the treadle-lever K^9, which lowers the roller K and throws the machine in operation, by withdrawing the actuating-bar Q^2 from engagement with the pulley S and connecting the pulley M^2 with the shaft M. The instant the machine begins its operation the cam *g* leaves the lever I and the clamping-jaws are moved by the action of their actuating-springs to their lower or clamping position. The tucker-blade is now actuated by the means described and the crimping-jaw moved inwardly to crimp the folds or creases, as described in connection with said constructions. The rollers are actuated at each rotation of the shaft G to advance the paper so as to present a fresh surface for the next succeeding fold or crease. In the machine described the shaft G will rotate five times during one rotation of the shaft O, while the shaft H will move through ten rotations during such time. If a larger or smaller number of folds or creases are desired in the sheet, the relative speeds of the shafts H and G to the shaft O will be changed accordingly. When the last crimp has been made in the sheet, the brake N will operate to stop the machine, the bar Q^2 will be thrown into engagement with the recess S′ of the pulley S, and the clutch M^5 disengaged from the pulley M^2, when the machine will be stopped. The sheet of paper will now be withdrawn and a new one inserted, when the operation will be repeated.

The operation of the machine after the paper has been inserted and the lever K^9 depressed is, as will be seen, entirely automatic and requires no supervision from the operator until the sheet is ready to be withdrawn and a new one inserted therein.

While I have shown a convenient and practical mechanism for carrying out my invention, I do not wish to limit myself thereto, but desire to have included within the scope of my invention broadly any means for accomplishing the result which my invention is designed to produce.

I claim as my invention—

1. In a paper-crimping machine, means for holding the sheet to be crimped, means for starting the bend in the desired direction, means for completing the fold and means for straightening the fold after the same is completed.

2. In a paper-crimping machine, means for holding the sheet to be crimped, a tucker-blade adapted to start the bend or fold in a desired direction, mechanism for actuating the holding means, and means for retracting the tucker-blade before the fold is completed.

3. In a paper-crimping machine, means for holding the sheet to be crimped, means for starting the bend in the desired direction, mechanism for actuating the holding means whereby the sheet is creased along the line of the bend and means for forming a plurality of folds in the paper.

4. In a paper-crimping machine, means for holding the sheet to be crimped, a tucker-blade adapted to start the bend or fold in the desired direction, means for actuating said holding mechanism whereby the sheet may be folded or creased along the line of the bend, mechanism for unfolding the fold and feeding the paper into the machine preparatory to forming other folds therein.

5. In a paper-crimping machine, two crimping-jaws, each provided with a clamping-jaw, a movable tucker-blade between the two crimping-jaws, means for advancing said blade to start the bend or crease in the sheet of paper in a desired direction, means for retracting said tucker-blade before the fold is completed and means for actuating one crimping-jaw and the clamping-jaw mounted thereon toward the other jaws.

6. In a paper-crimping machine, two crimping-jaws each provided with a clamping-jaw, a tucker-blade, means for advancing and retracting said jaws into and from the space between the two crimping-jaws, means for actuating one crimping-jaw with its clamping-jaw closed thereon toward the other jaws and means for separating said crimping-jaws and simultaneously raising the clamping-jaws.

7. A machine for crimping paper or the like comprising crimping-jaws, clamping-jaws mounted thereon, a tucker-blade adapted to reciprocate vertically between two sets of clamping and crimping jaws, means for actuating one of said crimping-jaws and means for actuating the clamping-jaws comprising a lever pivoted between its ends, one end of which is engaged with said clamping-jaws and means for actuating the opposite end of said lever.

8. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a tucker-blade adapted to reciprocate vertically between the two sets of clamping and crimping jaws, means for moving one of the crimping-jaws and the clamping-jaw mounted thereon toward the other set and means for raising both of said clamping-jaws comprising a lever pivoted between its ends, one end of which is engaged with said clamping-jaws and means for actuating the opposite end of said lever.

9. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a tucker-blade adapted to reciprocate between the vertical sets of

jaws, means for moving said jaws together, and means for raising the clamping-jaws comprising a lever pivoted adjacent thereto, a connecting-link pivoted to one end of said lever and engaged at its opposite end with said jaws, said link being so constructed that the clamping-jaws attached thereto may have lateral movement with relation to each other.

10. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a tucker-blade adapted to reciprocate between the vertical sets of jaws, means for moving said jaws together and means for raising the clamping-jaws comprising a lever pivoted adjacent thereto, a connecting-link pivoted to one end of said lever comprising a cross-head and two parallel arms each of the latter pivoted at one end to said cross-head and at their other ends to the clamping-jaws whereby said jaws may have lateral movement with relation to each other.

11. A paper-crimping machine comprising two crimping-jaws, means for holding the sheet of paper, a tucker-blade movable between the crimping-jaws to start the bend in the sheet of paper, means for retracting said tucker-blade before the fold is completed, means for actuating said crimping-jaws comprising a rotating shaft adjacent to one of said jaws and a cam on said shaft.

12. A machine for crimping paper or the like comprising two crimping-jaws, means for clamping the paper, a tucker-blade adapted to reciprocate between said crimping-jaws, means for moving one of said crimping-jaws toward the other comprising a tappet-surface on said jaw and a rotating shaft adjacent to said jaw provided with a cam adapted to engage said tappet-surface and means for automatically retracting said jaw comprising a spring on the movable jaw and engaging also a part on the stationary jaw.

13. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws, a tucker-blade adapted to reciprocate between said crimping-jaws, means for moving one of said crimping-jaws toward the other comprising a tappet-surface on said jaw and a rotating shaft adjacent to said jaw provided with a cam adapted to engage said tappet-surface, and means for retracting said jaw comprising a guide-rod engaged at one end with the stationary jaw, a shoulder on said rod, a shoulder on the movable jaw adjacent thereto and a spring interposed between said shoulders.

14. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws, a tucker-blade adapted to reciprocate between said crimping-jaws, means for moving one of said crimping-jaws toward the other comprising a tappet-surface on said jaw and a rotating shaft adjacent to said jaw provided with a cam adapted to engage said tappet-surface and means for retracting said jaw comprising a hollow cylindric boss on the movable jaw, a guide-rod mounted therein, a shoulder on said rod adjacent to the boss, a second shoulder in said cylindric boss, and a spring interposed between said shoulders, said guide-rod being engaged at its opposite end with the stationary jaw.

15. A paper-crimping machine comprising a frame and a relatively wide table for supporting the sheet to be crimped, suitable guides on the frame which engage the side margins of the table, means for imparting a slight forward movement to the table and means for automatically retracting the table.

16. A paper-crimping machine comprising a frame and a relatively wide table for supporting the sheet to be crimped, suitable guides on the frame which engage the side margins of the table, means for imparting a slight forward movement to the table and a spring near each side acting to automatically retract the table.

17. A machine for crimping paper or the like comprising two crimping-jaws, means for holding a sheet of paper thereon, means for moving said jaws together, a blade adapted to reciprocate between said jaws and means for actuating said blade comprising a lever pivoted upon a shaft mounted adjacent to said blade, operative connections between said blade and one end of the lever, means for oscillating the lever to move the blade between said jaws and means for retracting said lever comprising a torsional spring connected at one end with the shaft and engaged at its other end with said lever.

18. A machine for crimping paper or the like comprising two crimping-jaws, means for holding a sheet of paper thereon, means for moving said jaws together, a blade adapted to reciprocate between said jaws, and means for actuating said blade, comprising a lever pivoted upon a shaft mounted adjacent to said jaws, operative connections between said blade and one end of the lever, means for oscillating said lever to move the blade between said jaws, means for retracting said lever, comprising a torsional spring connected at one end with said shaft and engaged at its other end with said lever, and means for adjusting the tension of the spring.

19. A machine for crimping paper or the like comprising two crimping-jaws, means for holding a sheet of paper thereon, means for moving said jaws together, a blade adapted to reciprocate between said jaws, and means for actuating said blade, comprising a lever pivoted upon a shaft mounted adjacent to said jaws, operative connections between said blade and one end of the lever, means for oscillating the lever to move the blade between said jaws, and means for retracting said lever comprising a collar on the shaft, and a torsional spring connected at one end with said lever and at its opposite end with said collar, said collar being movably secured to the shaft, whereby the tension of said spring may be adjusted as desired.

20. A machine for crimping paper or the like

comprising two crimping-jaws, means for clamping the paper thereon, means for moving said jaws together, upper and lower blades adapted to alternately reciprocate between said jaws, and means for actuating said blades.

21. A machine for crimping paper or the like comprising two crimping-jaws, means for clamping the paper thereon, means for moving said jaws together, upper and lower blades adapted to alternately reciprocate between said jaws, and means for actuating said blades comprising upper and lower levers pivoted between their ends and each connected at one end with the adjacent blade, a rotating shaft, and operative connections between said shaft and both of said levers.

22. A machine for crimping paper or the like comprising two crimping-jaws, means for clamping the paper thereon, means for moving said jaws together, upper and lower blades adapted to alternately reciprocate between said jaws, and means for actuating said blades comprising upper and lower levers pivoted between their ends each connected at one end thereof with the adjacent blade, a rotating shaft, a cam on said shaft, a tappet-surface on one of said levers and an actuating-bar engaging the other lever, said cam being adapted to engage said tappet-surface and actuating-bar alternately in each rotation of the shaft to actuate said blades.

23. A machine for crimping paper or the like comprising two crimping-jaws, means for holding a sheet of paper thereon, means for moving said crimping-jaws together, a blade adapted to reciprocate between said jaws, and means for advancing the sheet of paper as it is crimped comprising two coacting rollers mounted perpendicular to the line of movement of the said sheet and means for actuating said rollers.

24. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, means for moving said crimping-jaws together, a blade adapted to reciprocate between the two vertical sets of jaws, a rotative shaft, operative connections between said shaft and clamping-jaws for raising the latter, means for advancing a sheet of paper between said jaws comprising two coacting rollers mounted perpendicular to the line of movement of said sheet, and operative connections between said rollers and said shaft.

25. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws, and means for raising the clamping-jaws, of means for feeding a sheet of paper between the upper and lower sets of jaws comprising two coacting rollers mounted perpendicular to the path of movement of the sheet of paper, an oscillating arm on one of said rollers adapted to move loosely on said roller in one direction of its movement and to be engaged therewith in its movement in the opposite direction, a rotative shaft, operative connections between said shaft and arm to oscillate the latter and means for restoring said arm to its normal position.

26. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws, and means for raising the clamping-jaws, of means for feeding a sheet of paper between the upper and lower sets of jaws comprising two coacting rollers mounted perpendicular to the path of movement of the sheet of paper, an oscillatory arm on one of said rollers adapted to move loosely thereon in one direction of its movement and to be engaged therewith in its movement in the opposite direction, a rotative shaft, operative connections between said shaft and arm to oscillate the latter, and a restoring-spring engaging said arm adapted to act thereon when the arm is operatively engaged with the shaft.

27. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws, and means for actuating each set of jaws, of means for advancing a sheet of paper between the upper and lower sets of jaws comprising coacting rollers mounted perpendicular to the line of movement of the paper, a ratchet-wheel on one of said rollers, an arm pivotally mounted adjacent to said wheel provided with a pawl adapted to have engagement with the ratchet-wheel, operative connections between the main driving-shaft of the machine and said arm for oscillating the latter on its pivot, and means for restoring said arm to its normal position.

28. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a knife adapted to reciprocate between the two vertical sets of jaws, means for moving said crimping-jaws together, a rotative shaft, operative connections between said shaft and clamping-jaws for raising the latter, means for advancing a sheet of paper between the upper and lower sets of jaws comprising two coacting rollers arranged perpendicular to the line of movement of the sheet and means for actuating said rollers from the shaft by which the clamping-jaws are operated, comprising a ratchet-wheel on one of said rollers, a cam on the adjacent end of the shaft and an actuating-rod provided on one end with a pawl engaging said ratchet-wheel and adapted to be engaged at its opposite end by the said last-mentioned cam.

29. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws and means for actuating each set of said jaws, of means for advancing a sheet of paper between the upper and lower sets of

jaws comprising coacting rollers, mounted perpendicular to the line of movement of the paper, a ratchet-wheel on one of said rollers, an arm pivotally mounted adjacent to said wheel, a pawl on said arm adapted to engage said ratchet-wheel, a shaft provided with a cam, an actuating-rod mounted on said pivotal arm and adapted to be intermittingly engaged at its opposite end by said cam and means for restoring said arm when it has been oscillating by said cam.

30. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the two vertical sets of jaws and means for raising said clamping-jaws, of means for feeding a sheet of paper between the upper and lower sets of jaws comprising two coacting rollers mounted in the path of the paper and perpendicular to the line of movement thereof, a ratchet-wheel on one of said rollers, an oscillatory arm pivoted adjacent to said wheel, a pawl on said arm adapted to engage said wheel, a rotating shaft provided with a cam, an actuating-bar connected at one end with the oscillatory arm and adapted to be engaged at its other end by said cam, a restoring-spring on said arm and means for moving the actuating-bar endwise on said oscillatory arm whereby the throw of said arm may be varied.

31. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between the two vertical sets of jaws and means of raising said clamping-jaws, of means for feeding a sheet of paper between the upper and lower sets of jaws comprising two coacting rollers mounted in the path of the paper and perpendicular to the line of movement thereof, a ratchet-wheel on one of said rollers, an oscillatory arm pivoted adjacent to said wheel, a pawl on said arm adapted to engage said wheel, a rotating shaft provided with a cam, an actuating-bar connected at one end with the oscillatory arm and adapted to be engaged at its other end by said cam, a restoring-spring on said arm, said oscillatory arm being provided with a longitudinal slot and an adjustable bearing-stud mounted in said slot to which the adjacent end of the actuating-bar is attached whereby said bar may be moved longitudinally of the arm to vary the throw thereof.

32. A machine for crimping paper or the like comprising two crimping-jaws, clamping-jaws mounted thereon, a blade adapted to reciprocate vertically between the two sets of jaws, means for automatically raising said clamping-jaws, means for moving the crimping-jaws together, and guides engaging said clamping-jaws to prevent lateral movement of each clamping-jaw with relation to the crimping-jaw upon which it is mounted.

33. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a tucker-blade adapted to reciprocate vertically between the two sets of crimping-jaws, means for automatically raising said clamping-jaws, means for moving the crimping-jaws together, and means for normally holding the clamping-jaws in their lower position.

34. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a blade to reciprocate between the two vertical sets of jaws, means for raising said clamping-jaws, means for moving the crimping-jaws together, guide-rods on said crimping-jaws which pass through apertures in the clamping-jaws, shoulders on the outer ends of said rods and means for normally holding said clamping-jaws in their lower position comprising springs interposed between said shoulders on the outer ends of guide-rods and opposing shoulders on said clamping-jaws.

35. A machine for crimping paper and the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a blade adapted to reciprocate between the two vertical sets of jaws, means for raising said clamping-jaws, means for moving the crimping-jaws together, guide-rods on said crimping-jaws which pass through apertures in the clamping-jaws, shoulders on the outer ends of said rods and means for normally holding said clamping-jaws in their lower position comprising springs interposed between said shoulders on the outer ends of said guide-rods and opposing shoulders on said clamping-jaws; said shoulders on the guide-rods being movable longitudinally of the rods, whereby the tension of the spring may be adjusted as desired.

36. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, means for moving said crimping-jaws together, means for raising said clamping-jaws, a knife or blade adapted to reciprocate between the two vertical sets of jaws and crimping-surfaces in the adjacent faces of said jaws arranged to come in contact with each other in the lateral movement thereof in advance of the main bodies of said jaws.

37. In a machine for crimping paper or the like the combination with crimping-jaws, clamping-jaws mounted thereon, a knife or blade adapted to reciprocate between said jaws and means for raising said clamping-jaws, of means for feeding a sheet of paper between said jaws comprising two coacting rollers mounted in the path of the paper and perpendicular to the line of movement thereof, and means for actuating said rollers comprising a rotative shaft, operative connections between said shaft and one of the rollers, said last-mentioned roller being normally maintained out of contact with the other roller and means for moving said roller into its operative position.

38. In a machine for crimping paper or the

like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife or blade adapted to reciprocate between said jaws and means for raising said clamping-jaws, of means for feeding a sheet of paper between said jaws comprising two coacting rollers mounted in the path of the paper and perpendicular to the line of movement thereof, means for actuating said rollers comprising a rotative shaft, operative connections between said shaft and one of the rollers, a treadle-arm pivoted to the frame of the machine and operative connections between said treadle-arm and said last-mentioned roller.

39. In a machine for crimping paper or the like, the combination with crimping-jaws, clamping-jaws mounted thereon, a knife adapted to reciprocate between said crimping-jaws, and means for raising said clamping-jaws, of means for feeding a sheet of paper between said clamping and crimping jaws comprising two coacting rollers mounted in the path of the paper and perpendicular to the line of movement thereof, means for actuating said rollers comprising a rotative shaft, operative connections between said shaft and one of said rollers, said last-mentioned roller being normally held out of contact with the other roller and means for moving and holding said roller in its operative position comprising a link engaged with the movable roller and provided with a slot through which the other roller passes, a treadle-arm pivoted to the frame of the machine and operative connections between said link and treadle-arm.

40. In a machine of the character described, the combination with the driving-shaft, provided with a power-wheel, a clutch for connecting said wheel with the shaft, a brake-pulley on said shaft, a friction-brake engaging said pulley, a second shaft adjacent to and operatively connected with the driving-shaft, means on said second shaft for actuating said brake, a segmental guide-surface on said second shaft, and an endwise-movable spring-actuated bar operatively connected at one end with said clutch and engaging at its opposite end said guide-surface, said clutch being maintained in its operative position when the bar is engaged with the guide-surface and being disengaged from the power-wheel when said guide-surface is in a position to allow the bar to move endwise thereon.

41. In a machine of the character described, the combination with the driving-shaft provided with a power-wheel, a clutch for connecting said wheel with the shaft, a brake-pulley on said shaft, a friction-brake engaging said pulley, a second shaft adjacent to and operatively connected with the driving-shaft, means on said second shaft for actuating said brake, a segmental guide-surface on said second shaft, and an endwise-movable, spring-actuated bar operatively connected at one end with said clutch and at its opposite end with said guide-surface, said clutch being maintained in its operative position when the bar is engaged with the guide-surface, and disengaged therefrom when the bar is released from said surface, and the parts being so arranged that the bar will be released and the clutch moved out of its operative position just before the said brake is exerting its most effective power upon said pulley.

42. In a machine for crimping paper or the like, the combination with the crimping-jaws, clamping-jaws mounted thereon, a crimping-knife adapted to reciprocate between said crimping-jaws, a driving-shaft provided with a power-wheel, a clutch for connecting said wheel with the driving-shaft, means for actuating said jaws from said shaft, operative connections also between said shaft and crimping-knife, a treadle-arm pivoted to the frame of the machine and operative connections between said treadle-arm and clutch, of a pulley on said main shaft, a friction-brake engaging said pulley, a second shaft adjacent to and operatively connected with said main shaft, means on said second shaft for actuating said brake, a segmental guide-surface on said second shaft, an endwise-reciprocating spring-pressed bar connected with the clutch and engaging said guide-surface, and operative connections between said bar and treadle-arm.

43. In a machine for crimping paper or the like, the combination with crimping-jaws clamping-jaws mounted thereon, a crimping-knife adapted to be reciprocated between the two vertical sets of jaws, a main shaft provided with a power-wheel, means for actuating said jaws from said shaft, operative connections also between said shaft and crimping-knife, feed-rollers mounted in the path of the paper and perpendicular to the line of movement thereof to feed the paper between said jaws, one of said rollers being normally raised out of contact with the other, a friction-clutch on the driving-shaft adapted to connect the power-wheel with said shaft and a lever engaging said clutch, of a treadle-arm, pivoted in said frame, operative connections between said arm and upper feeding-roller and operative connections also between said arm and the clutch-actuating lever.

44. In a machine of the character described, the combination with the driving-shaft, a friction-pulley on said shaft, a friction-brake engaging said pulley, a second shaft adjacent to and operatively connected with said driving-shaft, means on said second shaft for actuating said friction-brake, a segmental guide-surface on said second shaft, a power-wheel on the driving-shaft, a friction-clutch for connecting said power-wheel to the shaft, a spring-actuated lever engaging said clutch, an actuating-bar engaging at one end said lever and at its other end said guide-surface, and acting when engaged with the guide-surface to hold the clutch against the action of its spring in its operative position, whereby when said bar is disengaged from said surface the spring will actuate the lever to disengage the clutch from the power-wheel.

45. In a machine of the character described, the combination with the driving-shaft provided with a power-wheel, a clutch for connecting said wheel with the shaft, a brake-pulley on said shaft, a friction-brake engaging said pulley, a second shaft adjacent to and operatively connected with the driving-shaft, means on said second shaft for actuating said brake, a segmental guide-surface and an endwise-movable bar operatively engaged at one end with said clutch and engaging at its opposite end said guide-surface, said bar being arranged to maintain the clutch in its operative position when it is engaged with said guide-surface, and to allow said clutch to be released when disengaged therefrom.

46. In a machine of the character described, the combination with the driving-shaft provided with a power-wheel, a clutch for connecting said wheel with the shaft, a brake-pulley on said shaft, a friction-brake pivoted adjacent to said shaft comprising divergent arms embracing said pulley, a clamping-pin passing through the arms of said brake provided on one end with a shoulder, a lever engaging the opposite end of said pin and fulcrumed against the adjacent arm of the brake, a second shaft adjacent to the main shaft and operatively connected therewith, means on said second shaft for oscillating said lever of the friction-brake by which said brake is set upon the pulley, a segmental guide-surface on said second shaft and a spring-actuated bar operatively engaged at one end with said clutch and engaging at its other end said guide-surface.

47. In combination with a driving and a driven shaft, means for operatively connecting said shafts together, and a brake-pulley on said driving-shaft, of a friction-brake comprising divergent arms embracing said pulley, a clamping-pin passing through the outer ends of said arms, provided on one end with a shoulder, a lever engaging the opposite end of said pin and fulcrumed against the adjacent arm of the brake, and a cam on said driven shaft adapted to engage said lever to actuate said brake.

48. In a machine of the character described, the combination with crimping and clamping jaws, a knife adapted to reciprocate between said jaws, coacting rollers adapted to feed a sheet of paper between said jaws, one of said rollers being normally held out of contact with the other roller, a driving-shaft provided with a power-wheel and a treadle-arm pivotally mounted in said frame, of means engaging said arm for connecting the power-wheel with the driving-shaft and operative connections between said arm and the upper roller to move said roller into its operative position embracing a connecting-rod having slotted engagement with said arm whereby said arm may be moved to partially connect the power-wheel with the driving-shaft before actuating said upper roller.

49. In a machine of the character described, the combination with crimping and clamping jaws, a knife adapted to reciprocate between said jaws, coacting rollers adapted to feed a sheet of paper between said jaws, one of said rollers being normally held out of contact with the other roller, a driving-shaft provided with a power-wheel and a treadle-arm pivotally mounted in said frame, of means engaging said arm for connecting the power-wheel with the driving-shaft, operative connections between said arm and the upper roller to move said roller into its operative position, embracing a connecting-rod having slotted engagement with said arm whereby said arm may be moved to partially connect the power-wheel with the driving-shaft before actuating said upper roller, and an adjusting-plate on said connecting-rod to vary the length of the slot therein.

50. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws, means for moving said crimping-jaws together, means for raising the clamping-jaws, and an adjustable marginal stop on one of said crimping-jaws adapted to limit the movement of the paper when inserted between said jaws.

51. A machine for crimping paper or the like comprising two crimping-jaws, two clamping-jaws mounted thereon, a knife adapted to reciprocate between the vertical sets of jaws, means for moving said crimping-jaws together, means for raising the clamping-jaws, and an adjustable marginal stop on one of said crimping-jaws adapted to limit the movement of the paper when inserted between said jaws comprising a bar mounted on said jaw parallel with the acting face thereof, an attaching-arm secured to said bar and having engagement with the upper face of the jaw, said arm being provided with a longitudinal slot, and a screw-threaded bolt passing through said slot and having screw-threaded engagement with said jaw.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 25th day of June, A. D. 1897.

CHRISTIAN H. STOELTING.

Witnesses:
TAYLOR E. BROWN,
WILLIAM L. HALL.