

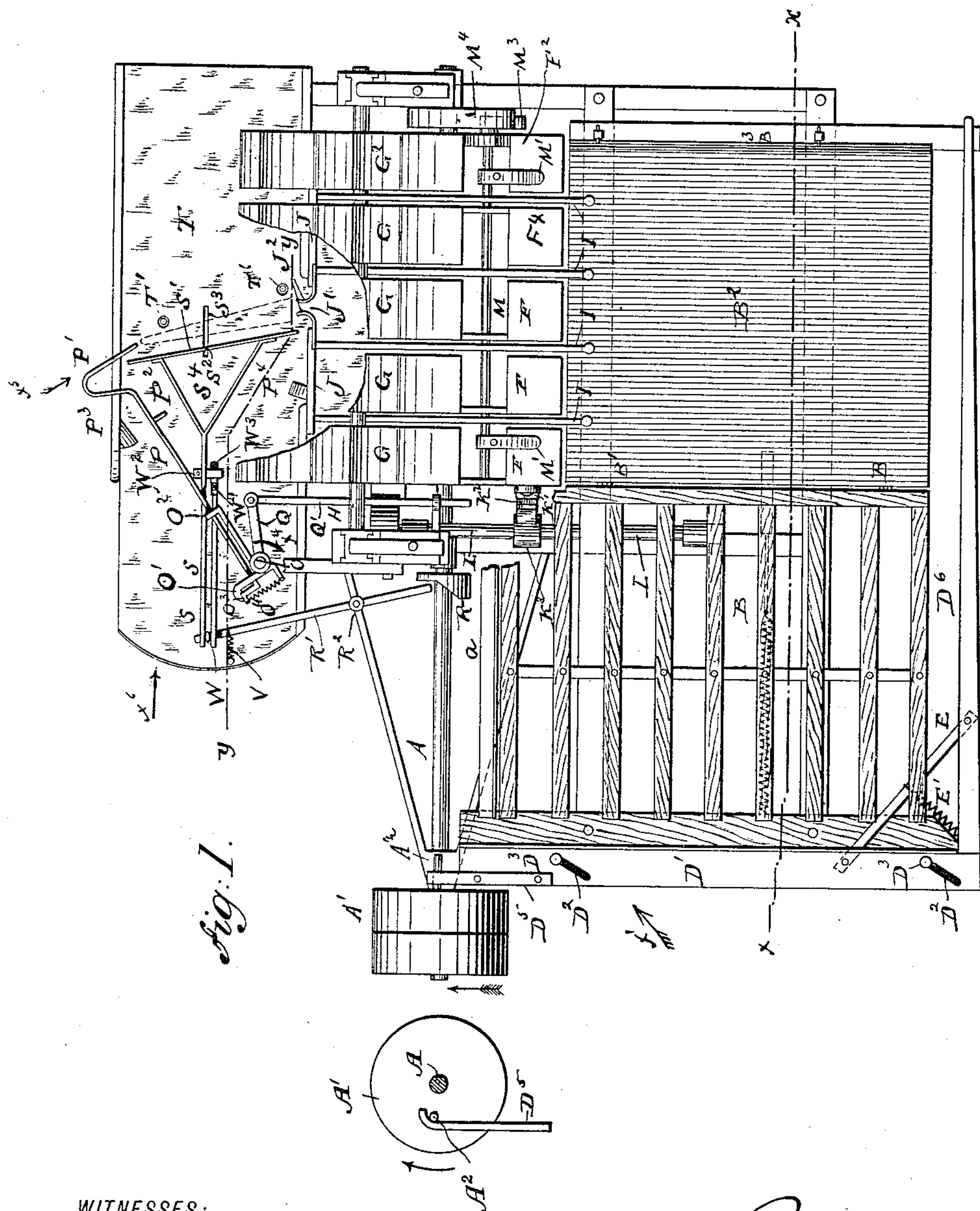
(No Model.)

3 Sheets—Sheet 1.

W. HILL.
PAPER FOLDING MACHINE.

No. 379,698.

Patented Mar. 20, 1888.



WITNESSES:

A. Schehl.
Carl Karp

INVENTOR.
Warren Hill.
BY
G. P. Raegen
ATTORNEYS.

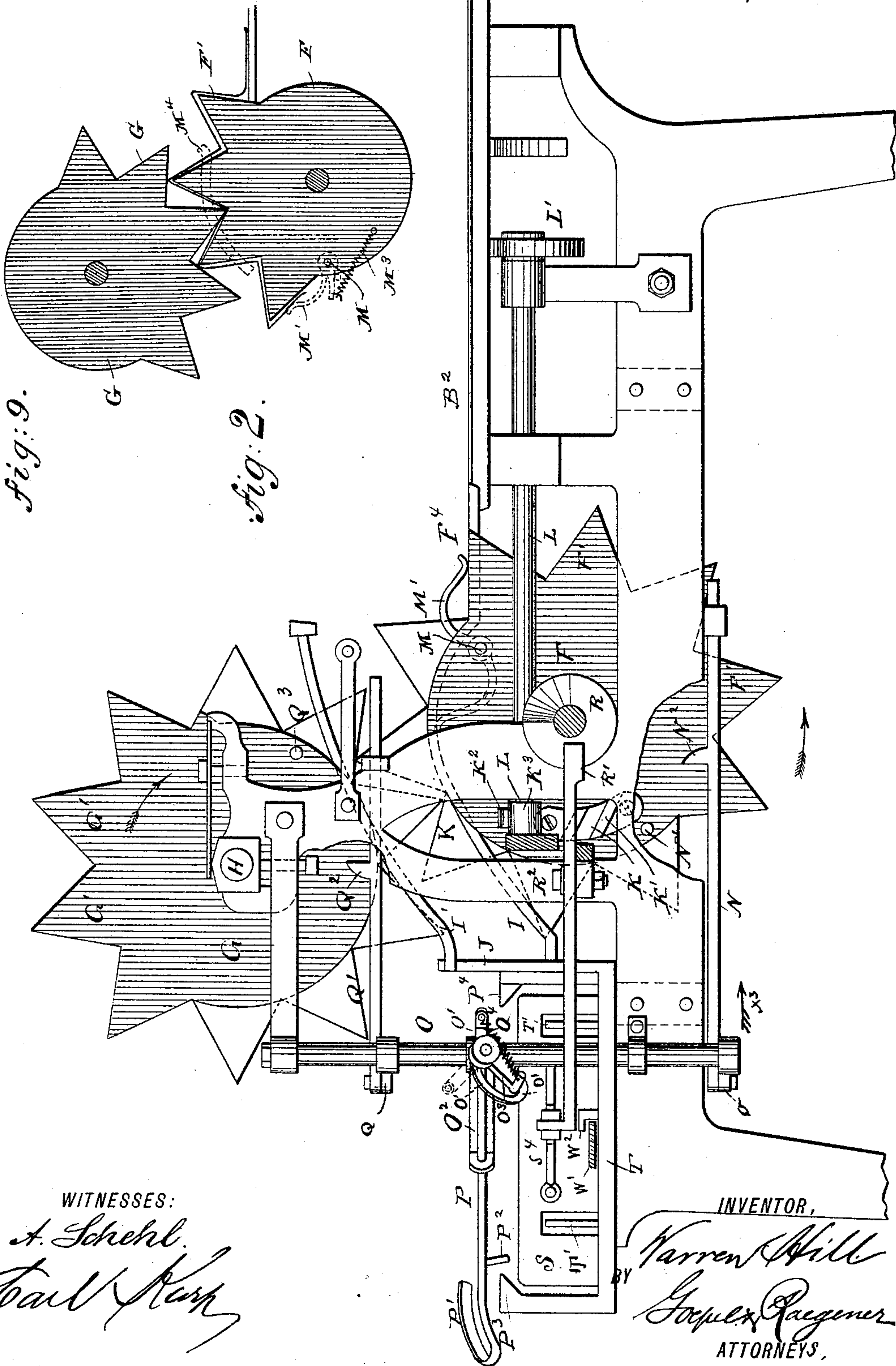
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3 Sheets—Sheet 2.

W. HILL.
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Patented Mar. 20, 1888.



WITNESSES:

A. Schehl.
Paul Karp

INVENTOR,

Warren Hill
BY
Gorham & Rogers
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WARREN HILL, OF TOWANDA, PENNSYLVANIA.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 379,698, dated March 20, 1888.

Application filed November 30, 1886. Serial No. 220,238. (No model.)

To all whom it may concern:

Be it known that I, WARREN HILL, of Towanda, in the county of Bradford and State of Pennsylvania, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

The object of my invention is to provide a new and improved machine for folding newspapers ready for wrapping and mailing.

The invention consists in a paper-folding machine constructed with a flier, toothed roller-sections for creasing and folding the paper, and a swinging rod also for creasing and folding the paper.

The invention also consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved machine for folding newspapers. Fig. 2 is a side view of the same, parts being broken out. Fig. 3 is an enlarged cross-sectional view of the table and flier on the line $x x$, Fig. 1. Fig. 4 is an enlarged cross-sectional view through the fluted rollers. Fig. 5 is a detail view of the cam. Fig. 6 is a detail view of the cam for operating the paper-holders. Fig. 7 is a cross-sectional view of one of the rollers, showing the configuration of the end disks. Fig. 8 is an enlarged detached sectional view on the line $y y$, Fig. 1, illustrating merely the mechanism for operating the pins $T' T'$. Fig. 9 is a detached view of the fluted rollers, in reduced size, showing their crimping-teeth intermeshing and the paper being folded between them.

Similar letters of reference indicate corresponding parts.

The driving-shaft A is provided with the pulleys A' . A flier, B, is hinged at B' to the left-hand edge of a platform, B^2 , at the right-hand end of which platform an angle or other bar, B^3 , is fastened edgewise, as shown in Fig. 3. To the under side of the flier B a curved arm, C, is fastened at the hinged end, and to said arm a wire, C' , is fastened, which is connected by a spring, C^2 , with the opposite part of the frame of the machine. When the flier is swung off the platform B^2 , its free edge rests upon the frame D, on which a flat bar or plate, D' , is mounted to slide diagonally, said plate

D' having diagonal slots D^2 , through which pins D^3 pass into the frame D. The frame D is provided with an edge, D^{15} , on which the swinging edge of the flier can rest, and an upwardly-projecting flange, D^4 . A hook, D^5 , projects from the end of the sliding bar or plate D' and is adapted to engage with the pin A^2 , projecting from the side of one of the pulleys A' . An angle-bar, a , is fixed on the frame adjacent to and parallel with the inner edge of the flier B, Fig. 1. A spring, E' is fastened to the frame of the machine and to a diagonal bar, E, fastened to the sliding bar D' and an arm, D^6 , of the same, which arm extends from the bar or plate D' entirely across the front of the machine and has its free end rested on the end of the bar B^3 , Fig. 1.

On the shaft A five cylinder-sections, F, are mounted a short distance from each other, said cylinder-sections each being provided with as many teeth F' as there are to be folds in the paper.

Above the shaft A a shaft, H, is journaled in the frame of the machine, on which as many sections G are mounted, which are shaped like the sections F and have the teeth G' , the sections G being shaped in such a manner that the teeth of the same can be passed into the recesses between the teeth or projections of the sections F. The end sections, F^2 and G^2 , on the shafts A and H are provided with the teeth entirely around the circumference, as shown in dotted lines in Fig. 7. The teeth F' of the section F^2 on the shaft A engage with the teeth of the section G^2 on the shaft H, so that said shaft H can be revolved from the shaft A. Through the spaces between the ends of the sections F the curved guide-bars I I' , Fig. 4, are passed and fixed, between which the papers pass, the rear ends of the guide-bars being connected by the plates J, placed edgewise, between the inner edges of which plates a slot, J' , is formed, the curved guide-pieces J^2 forming the sides of the slot, said guide-pieces being fastened to the ends of the bars J.

On the outer surface of that section F next the pulley A' , a plate, K, having two teeth, K' , is fastened, which can engage with the two teeth K^2 of a collar, K^3 , on the shaft L, journaled below the flier at right angles to the shaft A, on the end of which shaft the curved arm L' is

fastened, which can act on the under side of the flier, as shown in Fig. 3, the plates K and toothed collar being shown in Fig. 5.

A shaft, M, is passed through the several 5 bottom sections, F, and mounted to revolve on its axis, and is provided with spring-arms M', which can rest upon the sides F⁴ of the first teeth of the bottom sections, F, as shown in Fig. 2. An arm, M³, is fastened to one end of 10 said shaft and can be acted upon by a fixed segmental cam-plate, M⁴, fixed to the frame of the machine, adjacent to the right-hand bottom section, F², as shown in Fig. 1.

A pin, N', projects from the outer surface of 15 the left-hand bottom section, F, and can act on the tooth or projection N² of a sliding bar, N, suitably guided on the frame, and having its end connected with the arm o of a vertical shaft, O, having the two arms O' and O², Fig. 20 1, at right angles to each other, in which a rod, P, is mounted to turn on its longitudinal axis, said rod being provided at one end with a cranked arm, O³, to which a spring, O⁴, is fastened, the other end of which is fastened to 25 the arm O' on the shaft O. The opposite end of the rod P is provided with a hook, P', and with a lug, P², upon which two beveled projections, P³ and P⁴, on the frame of the machine can act, in the manner that will be set 30 forth hereinafter.

The shaft O is also provided with an arm, Q, connected with a sliding rod, Q', suitably 35 guided, and having a projection, Q², on which a pin, Q³, or projection on the left-hand upper end section, G, can act. A cam-disk, R, is mounted on the shaft A and can act on one end of the lever R', pivoted at R², and to that end of the lever R' opposite the one at the cam R a rod, S, is pivoted, which has the op- 40 posite end, S⁴, forked, on which fork a cross-piece, S', is fastened, which slides on the table T at the rear end of the machine, said cross-piece S' being guided by a pin, S², passing through a longitudinal slot, S³, in the table T. 45 A short distance to the right of the cross-piece S' two pins, T', project up through apertures in the table, said pins being fixed on a cross-piece, U, on the end of a lever, U', pivoted below the table T and provided at the end op- 50 posite the pins T' with a weight, U².

To the same end of the lever R' to which the rod S is pivoted a rod, W, is pivoted, which is provided at its free end with a wedge-shaped 55 piece, W', adjacent to a fixed beveled projection, W², on the upper surface of the table T, said wedge-shaped piece W' being slightly to the right of the pivot of the lever U'. The table T is provided with a slot, W³, as shown in Fig. 8. A spring, V, is fastened to that end 60 of the lever R' to which the rods W and S are pivoted and draws the same in a direction toward the front end of said table T. A suitable spring, M³, is provided for bringing the shaft M back into its original position after 65 the arm M³ on the same has been acted upon by the cam M⁴, as shown in Fig. 4.

The operation is as follows: The sheet of

paper is placed upon the platform B² and the flier B, as indicated by the heavy dotted line in Fig. 3. The pin A² of the pulley A' strikes 70 against the prong of the hook D⁵ and draws the bar or plate D' diagonally in the direction of the arrow x', Fig. 1, as said plate is guided by the pins D³ in the slots D², and thereby the sheet is shifted or moved into the proper po- 75 sition, so that its edges rest upon the tops of the teeth F⁴ of the sections F, said sections being shown in Fig. 2. The pin A² snaps off the hook D⁵, and then the plate D' is drawn back in the inverse direction of the arrow x' and 80 into its original position by the spring F'. At that moment the teeth K' of the plate K on the end bottom section, F, act on the teeth K² of the collar K³, whereby the shaft L is rotated in the direction of the arrow x², Fig. 3, 85 and the arm L' is swung up and swings the flier B over upon the platform B², whereby the sheet is doubled—that is, folded at its middle—and now rests upon the platform B² and upon the teeth F⁴. By this time the 90 sections F are in such a position that the arm M³ passes under the segmental cam-piece M⁴ and is swung into the position shown in dotted lines in Fig. 6, whereby the spring-arms M' are swung down upon the surfaces 95 F⁴ of the teeth and hold the sheet on said surfaces. The sections F and G continue to revolve and carry the sheet along with them and crease the same between the teeth F' and G' of 100 the bottom and top sections, the paper passing between the guides I and I'. When the teeth of the sections begin to separate, as shown in Fig. 4, the creased paper rests against the plates J, as shown in Fig. 4, and the sections 105 continue their rotation, and at the proper time grasp a fresh doubled sheet from the platform B², and so on. As the sections continue to revolve, the pin N' on the lower end section, F, strikes the projection N², whereby the bar N is moved in the direction of the arrow 110 x³, Fig. 2, and the shaft O is turned in the direction of the arrow x⁴, Fig. 1, and thus the hook-rod P is swung in the direction of the arrow x⁵, Fig. 1, the hook passing over the top edges of the folded paper m, resting against 115 the plates J. The lug P² strikes the beveled projection P⁴, and thereby the rod is turned ninety degrees and the hook end P' is swung down, as shown in dotted lines in Fig. 4, and over the folded paper, the spring O⁴ 120 preventing the rod P from turning on its axis while it is being swung and before the lug P² strikes said projection. By this time the pin Q³ on the upper end section, G, strikes the projection Q² on the rod Q', whereby the shaft 125 O is turned in the inverse direction of the arrow x⁴ and the hook P' drawn through the slot J', and as it is in the position shown in Fig. 4 it pulls the folded paper through with it, whereby the papers are again folded—that is, 130 the folded paper is creased at its middle by being drawn through the slot J'. The rod P is swung in the inverse direction of the arrow x⁵, and when its lug P² strikes the bevel pro-

jection P³, the hook P' is swung back into its original position and the paper dropped in the position shown in dotted lines in Fig. 1 and is between the sliding cross-piece S' and the pins T'. By this time the cam R acts on the rod R' and swings the swinging end of the same, connected with the bar S, in the direction of the arrow x⁶, Fig. 1, whereby the paper is pressed against the pins T' by the cross-piece S'. When the bar S is moved a short distance, the wedge-piece W' on the bar W strikes the bevel W² on the top of the table T, whereby the said wedge-shaped piece is forced downward and acts on the lever U' and swings the same downward, whereby the pins T' are lowered below the surface of the table T, permitting the cross-piece S' to press the paper beyond the pins T'. The bars S and W are then moved back by the spring V, and the pins T' are raised by the weight U² on the end of the lever U', whereby the table is again ready for the next paper. The paper is thus first folded by the flier, so as to have about one-half of its area. It is then grasped by the spring-fingers M' and held on the teeth-surfaces F⁴ of the bottom sections and creased, the creases made by the sections F and G being at right angles to the crease made by the flier. Then the folded or creased paper is again folded and creased by being drawn through the slot J', the crease formed by being drawn through said slot being at right angles to the creases formed by the sections F and G and parallel with the crease formed by the flier.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A paper-folding machine constructed with a platform, a flier pivoted at one side edge of the platform, and series of toothed roller-sections at the rear of the platform, substantially as shown and described.

2. A paper-folding machine constructed with a platform, a swinging flier at one edge of the platform, and two series of roller-sections, one series above the other, at the rear of the platform, said roller-sections having teeth on part of their circumference, and guide-rods between the sections, substantially as shown and described.

3. A paper-folding machine constructed with a table or platform, a hinged flier at one side of the platform, two series of roller-sections behind the platform, the roller-sections having teeth on part of their periphery, guide-rods between the roller-sections, plates at the rear ends of the guide-rods, between the inner ends of which plates a slot is formed, and a hook for drawing the creased paper through the slot and folding the same, substantially as shown and described.

4. In a paper-folding machine, the combination, with a platform, of a flier pivoted at one side, two series of toothed roller-sections behind the platform, a shaft pivoted in the lower series of roller-sections, spring-arms on the shaft, an arm on the end of the shaft, and

a fixed cam acting on said arm, substantially as shown and described.

5. In a paper-folding machine, the combination, with a platform, of a flier pivoted at one side of the same, two series of toothed roller-sections behind the platform, guide-rods between the roller-sections, a shaft provided with an arm acting on the flier, a toothed collar on the shaft, and teeth on one of the roller-sections, substantially as shown and described.

6. In a paper-folding machine, the combination, with a platform, of a flier hinged at one side edge, two series of toothed roller-sections behind the flier, a vertical shaft, a rod held on said shaft and provided on its end with a hook, a reciprocating rod connected with the arm of said vertical shaft, a pin on one of the roller-sections for operating said reciprocating rod, and two plates placed edgewise behind and between the roller-sections, a slot being formed between the adjacent ends of the plates, between which slot the hook draws the papers creased by the roller-sections, substantially as shown and described.

7. In a machine for folding papers, the combination, with a platform, of a flier hinged at one side edge, two series of toothed roller-sections behind the platform, a vertical shaft having arms, rods connected with said arms, pins on the end sections of the two series of roller-sections for operating said rods, a rod provided with a hook mounted on arms of the vertical shaft, a lug on said hook-rod, bevel projections on the frame, which bevel projections act on said lug, and two plates behind and between the two series of roller-sections, a slot being formed between the adjacent ends of said plates, through which slot the papers are drawn by the hook-rod, substantially as shown and described.

8. In a paper-folding machine, the combination, with two series of toothed roller-sections, of guide-rods between the roller-sections, plates fastened to the rear ends of the guides, a vertical shaft operated from the roller-sections, a hook-rod on said vertical shaft, a plate or table over which the hook-rod swings, a sliding cross-piece on said table, and pins projecting through apertures in the plate, substantially as shown and described.

9. In a paper-folding machine, the combination, with two series of toothed roller-sections, of guides between them, plates fastened to the rear ends of the guides, a vertical shaft operated by the rollers, a hook-rod on said shaft, a plate or table over which the hook-rod swings, a cross-piece on said table, a pivoted lever connected to said cross-piece, a cam on the shaft of the lower series of toothed roller-sections, which cam acts on the pivoted lever connected with the sliding cross-piece, a lever pivoted below the table on which the cross-piece is mounted to slide, and pins projecting from said lever through apertures in the table, substantially as shown and described.

10. In a paper-folding machine, the combi-

nation, with two series of toothed roller-sections, of guides between the roller-sections, plates fastened to the rear ends of the guides, a vertical shaft operated by the roller-sections, 5 a swinging hook-rod on said shaft, a table over which the hook-rod swings, a sliding cross-piece on the table, the lever U', pivoted below the table, the pins T' on one end of the lever and passing through apertures in the 10 table, the weight U² on the opposite end of the lever, the fixed bevel piece W², the reciprocating rod W, having the wedge-shaped piece W', the pivoted lever R', connected with the rod W and with the rod fastened to the sliding cross-piece, and the cam R on the shaft of 15 the bottom series of roller-sections, substantially as shown and described.

11. In a paper-folding machine, the combination, with the platform B², of the flier B, the plate D', having diagonal slots D², the pins 20 D³, the hook D⁵ on the plate D', the pulley A', having a projecting pin, A², the cross-piece E, fastened to the plate D' and the arm D⁶ of the same, and the spring E', fastened to the frame of the machine, and the cross-piece E, 25 substantially as shown and described.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

WARREN HILL.

Witnesses:

F. E. JAYNE,

FRANK WARDELL.