

No. 676,533.

Patented June 18, 1901.

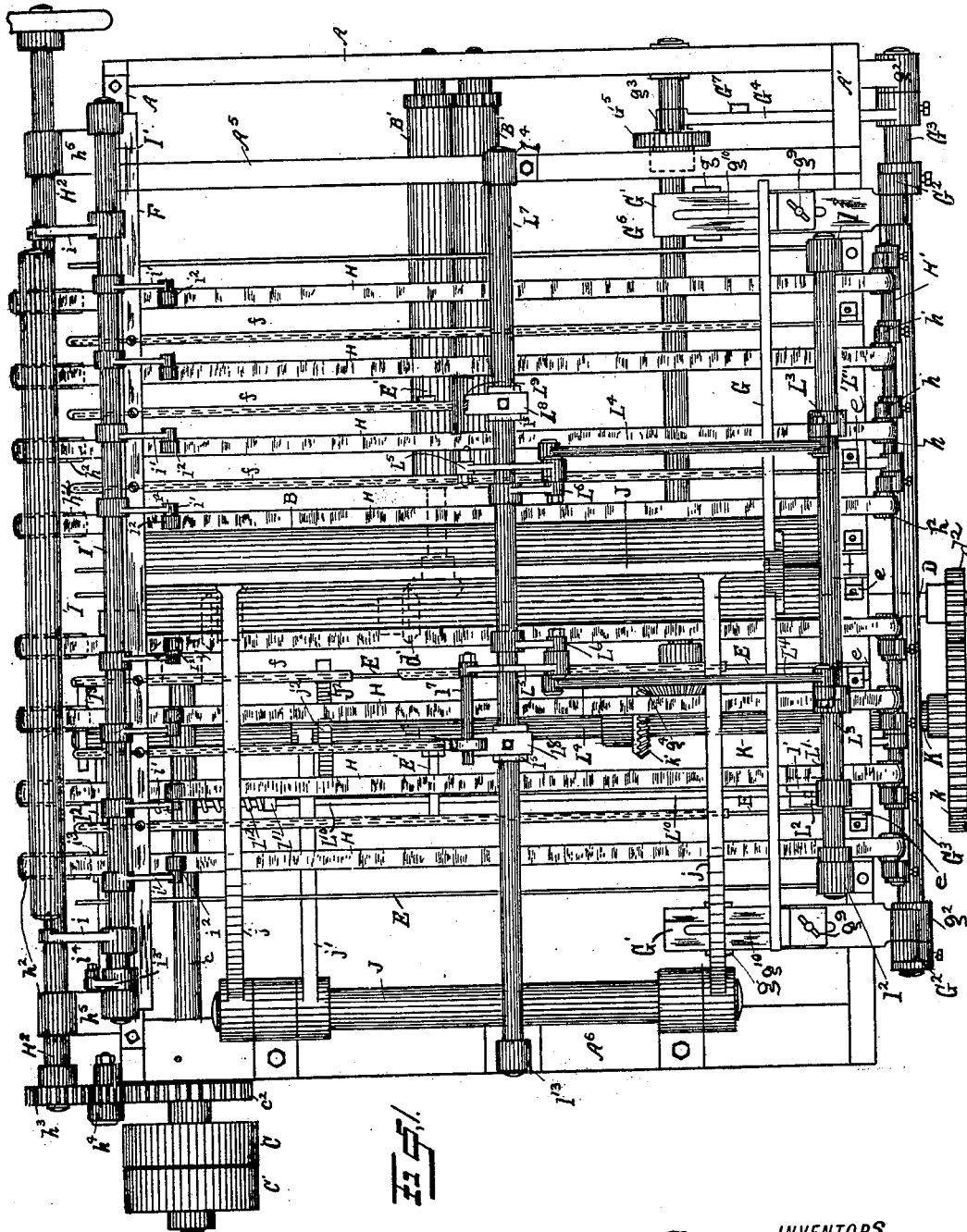
W. DOWNING & F. H. WENDT.

FOLDING MACHINE.

(Application filed Oct. 30, 1899.)

4 Sheets—Sheet 1.

(No Model.)



WITNESSES:

M. Perry
J. H. Brown

INVENTORS.
William Downing
Frederick H. Wendt
BY
H. C. Lord
ATTORNEY.

No. 676,533.

Patented June 18, 1901.

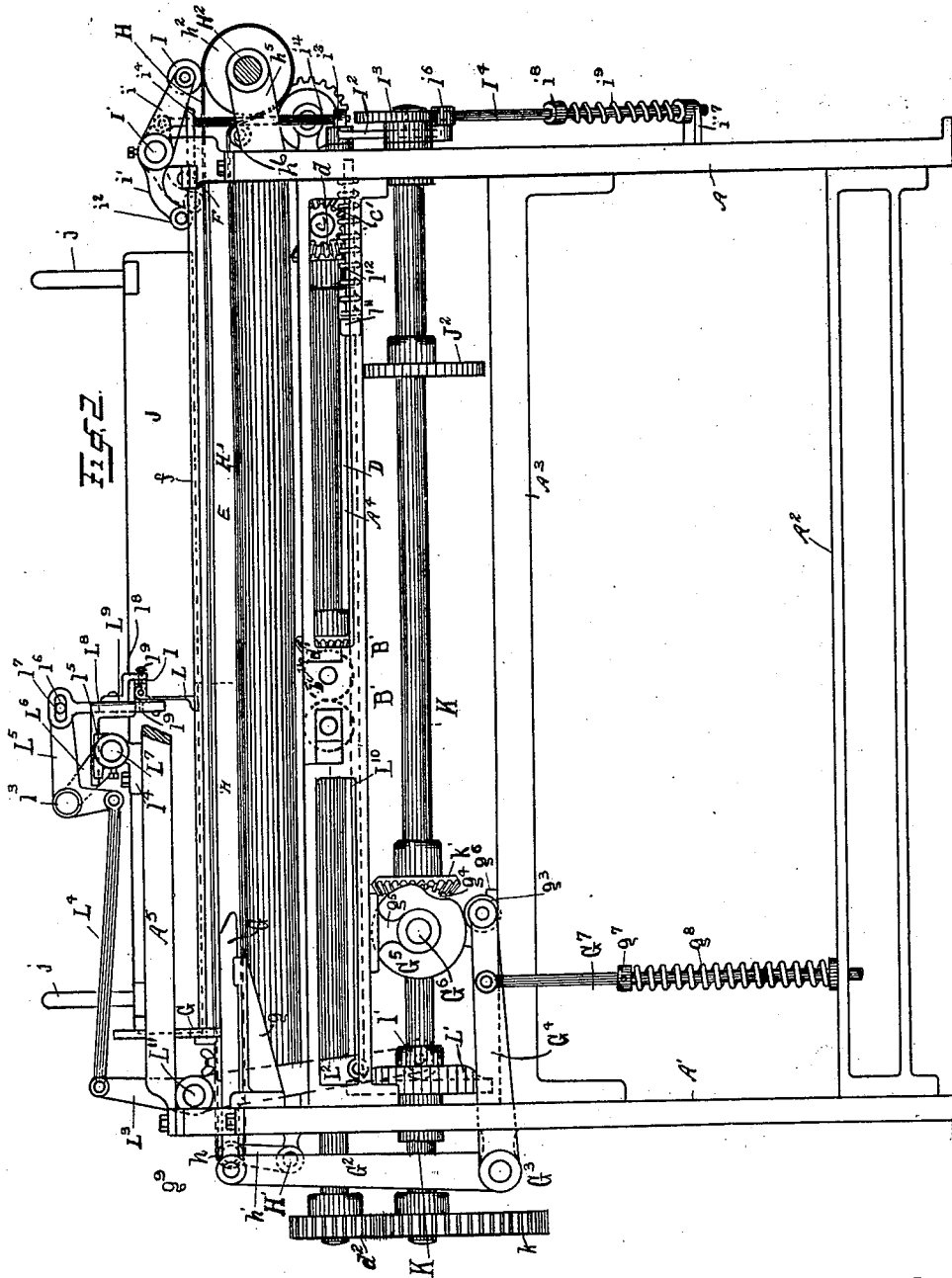
W. DOWNING & F. H. WENDT.

FOLDING MACHINE.

(Application filed Oct. 30, 1899.)

(No Model.)

4 Sheets—Sheet 2.



WITNESSES:

M. P. P.
J. H. Down

INVENTORS.
William Downing
Frederick H. Wendt
BY
W. L. Lusk
ATTORNEY.

No. 676,533.

Patented June 18, 1901.

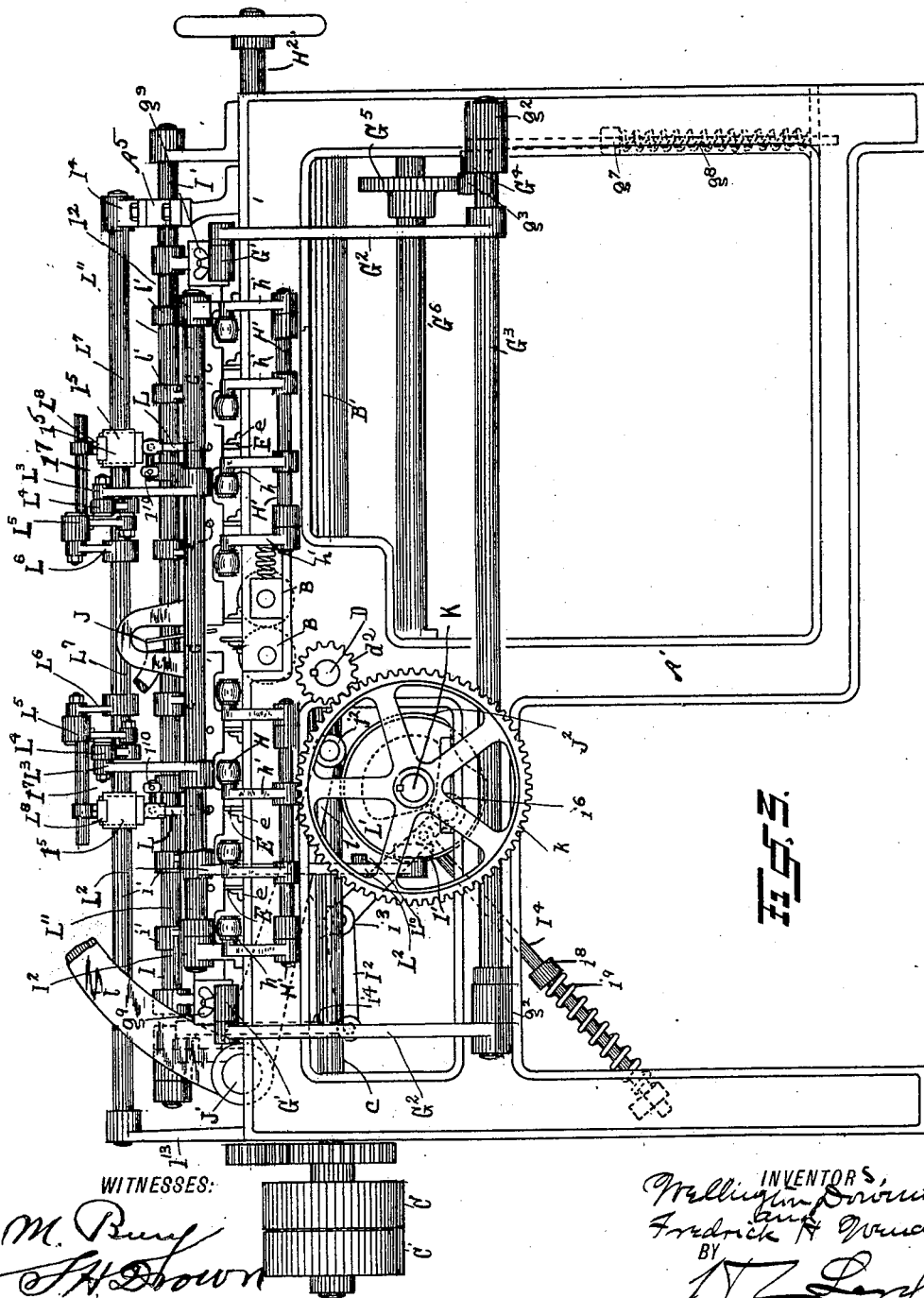
W. DOWNING & F. H. WENDT.

FOLDING MACHINE.

(Application filed Oct. 30, 1899.)

(No Model.)

4 Sheets—Sheet 3.



WITNESSES:

M. Bump
F. H. Wendt

INVENTORS
William Downing
Frederick H. Wendt
BY
N. Z. Land
ATTORNEY.

No. 676,533.

Patented June 18, 1901.

W. DOWNING & F. H. WENDT

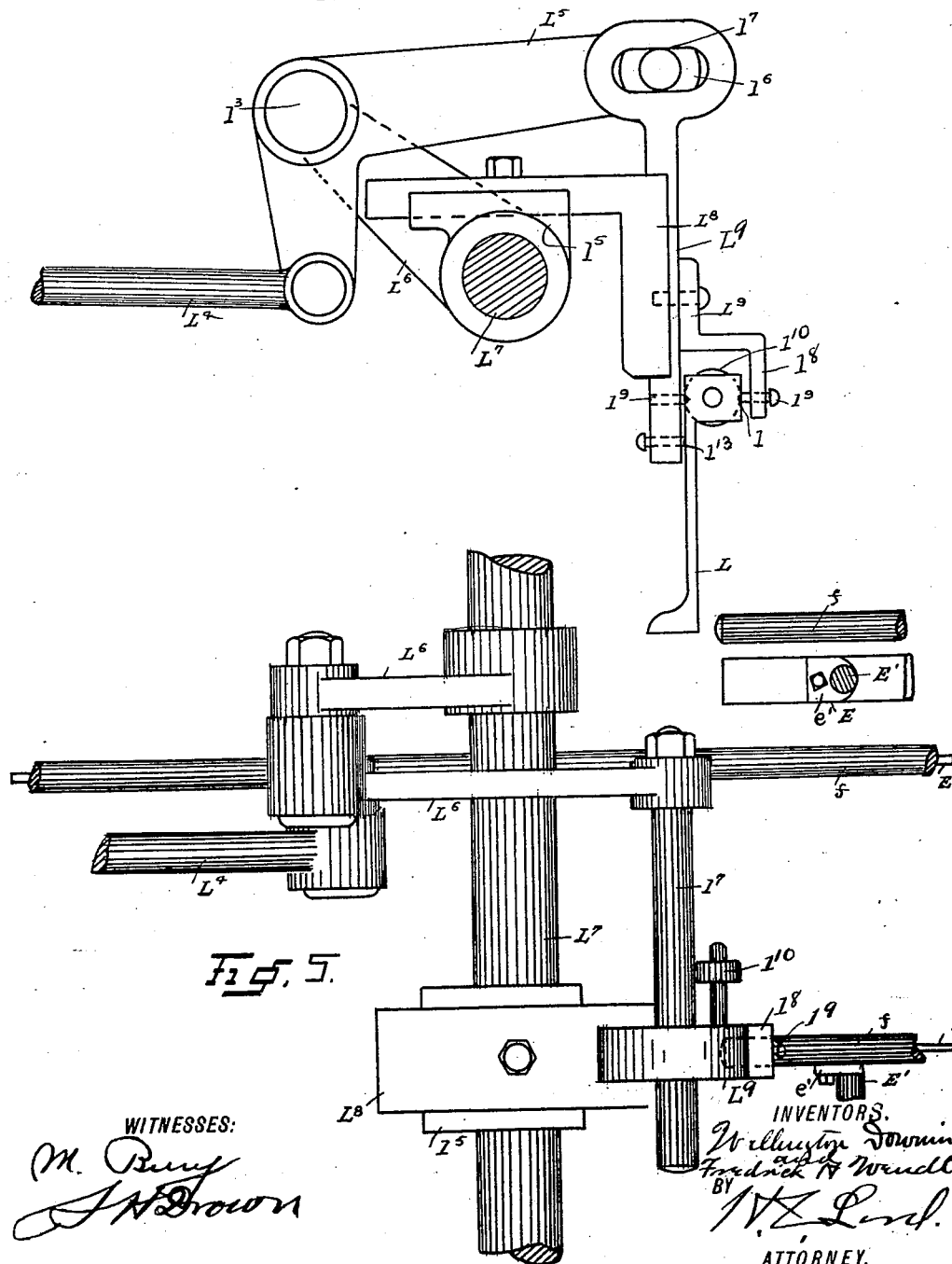
FOLDING MACHINE.

(Application filed Oct. 30, 1899.)

4 Sheets—Sheet 4.

(No Model.)

Fig. 4



WITNESSES:

M. Perry
J. N. Brown

INVENTORS.

Wellington Town
Frederick & Wendt

BY WZ Lind.

ATTORNEY.

UNITED STATES PATENT OFFICE.

WELLINGTON DOWNING AND FREDRICK H. WENDT, OF ERIE,
PENNSYLVANIA.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 676,533, dated June 18, 1901.

Application filed October 30, 1899. Serial No. 735,238. (No model.)

To all whom it may concern:

Be it known that we, WELLINGTON DOWNING and FREDRICK H. WENDT, citizens of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Folding-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to paper-folding machines; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and pointed out in the claims.

More particularly, the invention consists in providing a paper-folding machine with feeding devices arranged to carry the paper to a proper position over the folding-rolls and means for moving said feeding apparatus out of position to effect the movement of the paper when acted upon by the folding-rolls; also, an arrangement of registering mechanism which will permit the introduction of the paper in a direction transverse to its movement through the folding-rolls, as well as important details of construction, which will appear more fully in the following description and claims.

The invention is illustrated in the accompanying drawings, as follows:

Figure 1 shows a plan view of the machine. Fig. 2 shows a side elevation from the right of Fig. 1 of the machine. Fig. 3 shows a rear elevation of the machine, the point of view being from the bottom of Fig. 1. Figs. 4 and 5 show details of construction of the point device.

A marks the front part of the frame; A', the rear of the frame; A², A³, A⁴, A⁵, and A⁶, cross-pieces on the frame. These with braces and cross-pieces (not shown) comprise the frame. B B mark the first-fold rolls, and B' B' the second-fold rolls, which are set transversely to the first-fold rolls, as commonly. The machine is driven from the drive-pulley C, fixed on the shaft c. A loose pulley C' is also provided, as in the ordinary construction. Tapes H pass across the machine in a direction parallel to the axis

of the first-fold rolls or transversely to the direction taken by the paper when actuated by the first-fold rolls. The tapes pass over the loose pulleys h at the rear end of the machine and are driven by the pulleys h² at the front of the machine. The pulleys h are carried by arms h', which are fixed on a fixed shaft H'. The shaft H' is carried by suitable brackets on the frame. The arms h' are adjustable on the shaft H' to tighten the tapes H. The pulleys h² are fixed on a shaft H², and this shaft is journaled in brackets h³, extending from the frame. The shaft H² is driven by a gear h³, which is actuated, through the intermediate gear h⁴, by a gear c² on the shaft c. An idler h⁵ deflects the tapes from the bottom of the drive-pulleys h² to a position parallel to the upper line of tapes passing over said pulleys. Above the pulleys h² and resting on the tapes is a friction-roller I, which is carried by the arms i. The arms i are fixed on a rock-shaft I'. Extending from this rock-shaft toward the rear end of the machine are a series of arms i', on which are rolls i², one positioned over each tape. The arms i' and i are so arranged relatively to each other that when the roll I is in contact with the tapes on the rolls h² the rolls i² are lifted from the tapes, and vice versa.

As the paper passes through the machine it passes over the bars E, which are arranged below the path of the paper and just below the level of the tapes. They are secured to the frame by the small brackets e. Above the paper are arranged a series of rods f, which are secured by a bar F, which extends across the machine beneath the arms i'. The rods f extend through openings in a back-stop G. As the paper is fed into the machine the roller I is kept in contact with it to accelerate its speed, and after the paper has passed into the machine and assumed its proper position over the rolls the rock-shaft I' is actuated, bringing the rolls i² down upon the tapes H and depressing them so that they are brought beneath the level of the tapes of the bars E, so that as the paper is carried through the first folding-rolls the tapes do not interfere with the proper movement of the paper.

The rocking of the shaft I is accomplished by the following mechanism: A shaft D is

driven from the shaft *c* through the beveled gears *c'* and *d*. At the outer end of the shaft *D* is a gear *d*², which meshes with the gear *k* on a shaft *K*. The shaft *K* extends entirely
 5 across the machine and at its front end is provided with a cam *I*³. A rock-lever *I*² is pivoted at *i*³ on the frame and provided at its lower end with a cam-roller *i*⁶. A rod *I*⁴ is connected with the rock-lever *I*² and passes
 10 through a bracket *i*⁷ on the frame. A spring *i*⁹ is tensioned between the bracket *i*⁷ and the collar *i*⁸ on the rod, so as to press the rod upwardly. The effect of this pressure of the spring is to keep the cam-roller *i*⁶ in contact
 15 with the periphery of the cam *I*³. Extending upwardly from the end of the cam-lever *I*², opposite the roller *i*⁶, is a rod *i*⁴, which is connected at its upper end with an arm *i*⁵. The arm *i*⁵ is fixed on the rock-shaft *I*¹. The cam
 20 *I*³ is so shaped and positioned on the shaft *K* as to give the rocking movement to the lever *I*², and consequently the shaft *I*¹, at the time in the movement of the machine just hereinbefore described.

25 A starting-blade *J* is provided for the first-fold rolls, and this is carried by the arms *j*, and these arms are secured to the rock-shaft *J*¹. The arm *j* extends from the rock-shaft *J*¹, and on the lower end of this arm is a cam-roller *j*². A cam *J*³ is fixed on the shaft *K*
 30 and is so shaped and positioned as to give to the starting-bar the proper movement at the proper time. The weight of the starting-bar and the arms *j* and *j*¹ is sufficient to keep the roller *j*² in contact with the cam *J*³.

35 Owing to the different sizes of sheets of paper and imperfect registering mechanism used on presses it often happens that the printing matter does not uniformly cover the same
 40 parts of the sheets relatively to the edges of the sheets. In order to effect a fold in proper register with the printed matter rather than with the edges of the sheet, registering mechanisms have been devised for registering the
 45 sheet relatively to the printed matter rather than to the edges of the sheet. To do this, slits have been made in the sheet by a slit mechanism in the printing-press, which acts upon the paper at the same time the paper is
 50 printed, so as to have exactly the same relative position to the printed matter on each sheet. We have devised a means for registering paper on folding-machines with such slits
 55 where the paper is fed into the machine in a direction substantially parallel to the axis of the folding-rolls by which it is folded after the registering by said registering device. This mechanism is as follows: Two of the bars
 60 *E* are cut off, so that their end will come just in front of the slits when the paper is brought to the proper register. The end stop *G* is arranged to stop the paper with the slit just at the end of the bars *E*. Points *L* are arranged
 65 over the paper in line with the bars *E*, which are arranged in register with the slits in the paper. Mechanism is provided to raise and lower the points *L*. The paper as it moves

into the machine is first arrested by the stop *G*. The points *L* then depressing the paper in the path of the slit open the slit. The stop
 70 *G* is then made to recede, and tapes feeding the paper forward bring the shoulders of the slit against the points *L*, thus registering the paper in relation to the slits on the points *L*. The points *L* are arranged on a pivot *l*, which
 75 allows a pivotal movement of the points *L* toward the folding-rolls. By this arrangement the points may be left in contact with the paper until after the paper is brought completely into the bite of the rolls, the move-
 80 ment of the paper when actuated by the rolls swinging the points *L* on their pivots. This hinge or pivot mechanism we term a "yielding support" for the point device. Any device
 85 may be made operative with the axis of the pivot arranged in different directions; but where the axis is arranged parallel to the direction of movement of the paper, as in the device shown, the swinging movement of the point device not only allows it to yield with
 90 the movement of the paper, but carries it out of the slit as the paper moves into the rolls. A weight *l*¹⁰, arranged at an angle to the points *L*, brings the points *L* back to their normal position (in the machine shown the perpen-
 95 dicular position) and a stop *l*¹³ limits its backward movement.

The mechanism for actuating the points *L* is as follows: A cam *L*¹ is fixed on the shaft *K* and has the cam-surface on the side. A
 100 rock-lever *L*² extends from a rock-shaft *L*¹¹ and is provided at its lower end with a cam-roller *l*¹. A rod *L*¹⁰ extends from the lever *L*² across the machine into a perforation on the frame. A collar *l*¹¹ is provided on the rod,
 105 and a spring *l*¹² is tensioned against the said collar and the frame and presses the roller *l*¹, through the medium of the rod *L*¹⁰ and lever *L*², against the cam *L*¹. The rock-lever *L*¹¹ is journaled in the brackets *l*² on the frame.
 110 Extending upwardly from the rock-lever *L*¹¹ are the rock-arms *L*³, from which extend the links *L*⁴. The links *L*⁴ are connected to the lower arms of the bell-crank levers *L*⁵. The bell-crank levers *L*⁵ are journaled on a stud
 115 *l*³ on the arms *L*³. The arms *L*⁶ are fixed on a fixed cross-shaft *L*⁷. The cross-shaft *L*⁷ is secured to the brackets *l*⁴ and *l*¹³, arranged on the cross-pieces *A*⁵ and *A*⁶, respectively. Extending from the bell-crank lever *L*⁵ is a pin *l*⁷.
 120 This pin is of considerable length and extends through a slot *l*⁶, which is arranged in the upper end of a slide *L*⁹. The slide *L*⁹ is arranged to reciprocate in a guide *L*⁸. The guide *L*⁸ is secured in a bracket *l*⁵, which is
 125 fixed on the cross-shaft *L*⁷. The slide works in a dovetailed groove in the guide and is held in place by this formation. Extending outwardly from the slide is an arm *l*⁸, and extending from the arm *l*⁸ and from the slide
 130 *L*⁹ are the cone-pins *l*⁹, which form the pivot *l* for the points *L*. The cam *L*¹ is so shaped and positioned on the shaft *K* as to give to the points *L* the proper movement at the

proper time—that is, to lower the points L below the level of the rods E after the forward edge of the paper has passed by it and to hold it in this position during the receding movement of the end gage G and depression of the tapes H and the starting movement of the paper through the rolls. The points are then raised above the level of the lower edge of the rods *f* and held in this position until the front edge of a subsequent sheet has passed by it. By making the pin *l'* of considerable length the guide mechanism *L*⁸ may be shifted on the cross-rod *L'*, so as to adjust the points should there be any variation in the slits in this direction. The short rods E are also adjustable sidewise, so as to be brought in register with the registering-points in its different adjustments. A rod *E'* extends from the adjacent rod E through the short rod E, and the short rod E may be fixed on this support *E'* by a set-block *e'*.

The mechanism for effecting the movement of the stop G is as follows: The stop is carried by a slide *G'*, which is arranged in a guide formed by a bracket *g*. The slide *G'* is provided with a slot *g*¹⁰. Bolts pass through this slot and through brackets on the stop G. These are secured by the thumb-nuts *g*⁹. By this mechanism the stop G may be adjusted along the slot *G'*. A lever *G*² is connected with the outer end of the slide *G'* and is fixed on a rock-shaft *G*³. The rock-shaft *G*³ is journaled in brackets *g*², which extend from the frame. An arm *G*⁴ extends from the rock-shaft and has at its inner end the cam-roller *g*³. A shaft *G*⁶, journaled in brackets *g*³, is arranged across the machine and is driven from the shaft K through the bevel-gears *k'* and *g*⁴. A cam *G*⁵ is fixed on this shaft. The cam-roller *G*³ is arranged to roll on this cam. A rod *G*⁷ extends from the lever *G*⁴ into a perforation in the cross-piece *A*² of the frame. A collar *g*⁷ is arranged on the rod, and a spring *g*⁸ is arranged between this collar and the cross-piece *A*² and tensioned to press the rod *G*⁷ upwardly, and consequently to hold the cam-roller *g*³ in contact with the cam *G*⁵. The cam *G*⁵ is so shaped and so positioned on the rod *G*⁶ as to give to the stop G proper receding movement at the time of the movement of the machine hereinbefore described.

The first-fold rolls are driven one from the other, and one of them is driven through a gear on the shaft D. (Not shown.) A bevel-gear *d'* on the shaft D drives a bevel-gear *b'*, which is arranged to drive one of the rolls *B'*. The rolls *B'* are driven one from the other as ordinarily by gears at their end.

The operation of the machine is as follows: The paper is delivered on the tapes II and is passed under the roller I to the end stop G. This brings its edge by the roller *i*². The point L after the front edge has passed it is depressed so as to press the paper below the plane of the tapes of the bars E. The stop G is then drawn back by the mechanism hereinbefore described. The tapes press the pa-

per forward until the slits in the paper come into contact with the edge of the points L. The arms *i'* are then depressed to the position shown in dotted lines in Fig. 2 and depress the top or driving span of the tapes out of contact with the paper. The starting-blade then descends, starting the paper between the folding-rolls B B. The movement of the paper draws the points L L toward the rolls, the pivot *l* allowing this movement. The points L are then raised by the mechanism herein described, which completes the cycle of the machine.

What we claim as new is—

1. In a paper-folding machine, the combination of the folding-rolls; of a sheet-conveying mechanism arranged to carry the paper into position over said rolls; and means for carrying said conveying mechanism out of actuating position while the paper is moving through said folding-rolls.

2. In a paper-folding machine, the combination of the folding-rolls; of paper-conveying mechanism arranged to convey the paper in a direction parallel with the axes of said rolls over said rolls; and means for carrying said conveying mechanism out of actuating position while the paper is moving through said folding-rolls.

3. In a paper-folding machine the combination with the folding-rolls; of conveying-tapes arranged to carry the paper over said rolls; and means for moving said tapes out of contact with said paper during a folding movement of said paper through said rolls.

4. In a paper-folding machine, the combination with the folding-rolls; of conveying-tapes arranged to carry the paper in a direction parallel to the axes of said rolls over said rolls; and means for moving said tapes out of contact with said paper during a folding movement of said paper through said rolls.

5. In a paper-folding machine, the combination of the folding-rolls; conveying-tapes arranged to carry the paper over said rolls; bars for sustaining said paper; means for depressing said tapes below the level of said bars during a folding movement of said paper.

6. In a paper-folding machine the combination of the folding-rolls; conveying-tapes arranged to convey the paper in a direction parallel to the axes of the rolls; bars for sustaining said paper; means for depressing said tapes below the level of said bars during a folding movement of said paper.

7. In a paper-folding machine, the combination of the folding-rolls; tapes arranged to carry the paper over said rolls; a rock-shaft; a roller carried by said shaft, and adapted to be brought into contact with said tapes during the movement of said paper through the machine; a depressing-roller carried by said shaft at the opposite side of the conveying-roller; and means for rocking said shaft to bring said depressing-roller against the tapes after the passage of the paper and to depress the tapes out of contact with the paper.

8. In a paper-folding machine, the combination with the conveying-tapes; the rock-shaft, I'; the rolls, I and 2', carried thereby; means for rocking the shaft, I', to bring the
5 roll, I, into contact with the device during a passage of the paper and to bring the roll, 2', into a depressing position after the passage of the paper.
9. In a paper-folding machine, the combination with means for conveying the paper
10 into the machine and against the point device; said point device arranged to operate upon slits in said paper and to arrest the movement of the paper by engagement with
15 said slits; a slide carrying said point device; a guide for said slide; and means for reciprocating said slide in said guide for bringing the point into and out of operative position.
10. In a paper-folding machine, the combination of means for conveying paper into the
20 machine, and against a point device; said point device arranged to operate on slits in said paper and to arrest the movement of the paper by engagement with said slits; a slide
25 carrying said point device; a guide for said slide; means for reciprocating said slide in said guide for bringing the point device into and out of operative position; and means for adjusting said guide in the direction of the
30 movement of the paper into the machine.
11. In a paper-folding machine, the combination with folding-rolls, means for conveying the paper over said rolls, a point device
35 arranged to operate against the edges of slits in the paper conveyed into the machine by said means, and to arrest the movement of the paper so conveyed by abutment against the edges of said slits, and a yielding support for
40 said point device arranged to permit movement of said device with the paper in its movement through the folding-rolls.
12. In a paper-folding machine, the combination with folding-rolls; means for conveying paper over said rolls, a point device
45 arranged to operate against the edges of slits in paper conveyed into the machine by said means, and to arrest the movement of the paper so conveyed by abutment against the edges of said slits, and a swinging support
50 for said point device arranged to permit movement of said device with the paper in its movement through the folding-rolls.
13. In a paper-folding machine, the combination with folding-rolls, means for conveying paper over said rolls, a point device
55 arranged to operate against the edges of slits in paper conveyed into the machine by said means, and to arrest the movement of the paper so conveyed by abutment against the edges of said slits, and a swinging support for
60 said device having the axis of the pivot parallel to the direction of the movement of the paper into the machine; for the purpose described.
- 65 14. In a paper-folding machine, the combination with folding-rolls, means for conveying paper over said rolls, a point device arranged
to operate against the edges of slits in paper conveyed into the machine by said means, and to arrest the movement of the paper so conveyed by abutment against the edges of said slits, a yielding support for said point device
70 arranged to permit movement of said device with the paper in its movement through the folding-rolls, and means for bringing the points to normal position, after the folding movement with the paper.
15. In a paper-folding machine, the combination with folding-rolls, means for conveying paper into the machine over said rolls in
80 a direction parallel to the axis of said rolls, a point device arranged to operate against slits in said paper, as it is conveyed into the machine, and arrest the movement of the paper by engagement with said slits, and a yielding
85 support for said device arranged to permit the movement of the point with the paper in its movement into the folding-rolls.
16. In a paper-folding machine, the combination with the folding-roll; means for conveying paper into the machine over said roll
90 in a direction parallel to the axes of said roll; a point device arranged to operate against slits in said paper, said point device being arranged at the side of said folding-rolls; and
95 a pivot for said point device to permit an inward swing of the point with a folding movement of the paper.
17. In a paper-folding machine, the combination of a folding-roll, means for conveying
100 paper into the machine over said roll, a stop for stopping the impetus of said sheet, a point device arranged to engage a slit in said paper, means for moving said stop in a direction to allow the paper to move against the
105 registering-point, and a yielding support for said point device, arranged to permit of the movement of said point with the paper in its movement into the folding-rolls.
18. In a paper-folding machine the combination with the folding-rolls; means for conveying the paper into the machine over said
110 rolls in a direction parallel to the axes of said rolls; a stop for stopping the impetus of said sheet; a point device arranged to engage a slit in said paper; means for moving said
115 stop in the direction of the axes of the rolls to allow the paper to move against the registering-point, and a yielding support for said point device arranged to permit of the movement of said point with the paper in its movement
120 into the folding-rolls.
19. In a paper-folding machine, the combination with the folding-rolls; a sustaining-bar for sustaining the paper, said bar having
125 a shoulder in the path of a slit in an incoming sheet; means for moving the paper over said bar in a direction parallel to the axes of the rolls; and a point device arranged to operate in front of the shoulder formed by said
130 bar to open said slit, and to stop said paper by the abutment of the edge of said slit upon said point.
20. In a paper-folding machine, the combination with the folding-rolls; means for conveying paper into the machine over said rolls in a direction parallel to the axes of said rolls; a point device arranged to operate against slits in said paper, as it is conveyed into the machine, and arrest the movement of the paper by engagement with said slits, and a yielding support for said device arranged to permit the movement of the point with the paper in its movement into the folding-rolls.

nation with the folding-rolls; a sustaining-bar for sustaining the paper, said bar having a shoulder in the path of a slit in an incoming sheet; means for moving the paper over said bar in a direction parallel to the axes of the rolls; a point device arranged to operate in front of the shoulder formed by said bar to open said slit upon said point; and a pivot for said point device to allow it to swing toward the folding-roll during a folding movement of the paper.

21. A registering mechanism for paper-folding machines comprising a fixed guide; a slide arranged to reciprocate in said guide; a point carried by said slide; and a pivot for said point arranged to allow the point to swing in a direction transverse to the registering movement of the paper to said point.

22. In a paper-registering mechanism, the combination with the rod, L^7 ; of the arm, L^6 ; bell-crank lever, L^5 ; slide L^3 ; point, L , pivoted in said slide; the guide, L^8 ; and the bracket, L^7 , fixed on the shaft, L^7 , for supporting said guide.

23. In a paper-registering mechanism, the combination of the shaft, L^7 ; arm, L^6 ; bell-crank lever, L^5 , journaled thereon; pin, L^7 , extending from said bell-crank lever; the slotted slide, L^3 , engaging said pin; the guide, L^8 , supporting said slide; the bracket, L^7 , adjustably arranged on the shaft, L^7 ; and the point, L , carried by the slide, L^3 .

24. In a paper-folding machine, the combination with the folding-rolls; tapes arranged to convey paper into the machine in a direction parallel to the axes of said rolls; bars arranged to sustain the paper; a registering device arranged to register by operating upon said slits in said paper; and means for depressing the tapes below the level of the sustaining-bars during a folding movement of the paper.

25. In a paper-folding machine, the combination with the folding-rolls; tapes arranged to convey paper into the machine in a direction parallel to the axes of said rolls; bars arranged to sustain the paper; a paper-registering point arranged to operate upon slits of an incoming sheet of paper, said registering-point being pivoted to allow it to swing toward the paper-folding roll during a folding movement of the paper; and means for depressing the tapes below the level of the sustaining-bars during the folding movement of the paper.

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

nation with the paper-folding rolls; the tapes arranged to carry the paper into the machine in a direction parallel to the axes of said rolls; the rock-shaft, I^1 , carrying the rolls, I and i^2 , at the opposite side thereof; means for rocking said shaft to bring the roll, I , into contact with the tapes during the incoming movement of the sheet, and to bring the roll, i^2 , into depressing position after the passage of the sheet; sustaining-bars for sustaining the paper after the depression of the tapes; a registering-point for operating upon the slit in the incoming paper; and a pivot for said registering-point to allow it to swing toward the folding-roll during the folding movement of the paper.

27. In a paper-folding machine, the combination with the paper-folding rolls; the tapes arranged to carry the paper into the machine in a direction parallel to the axes of said rolls; the rock-shaft, I^1 , carrying the rolls, I and i^2 , at the opposite side thereof; means for rocking said shaft to bring the roll, I , into contact with the tapes during the incoming movement of the sheet, and to bring the roll, i^2 , into depressing position after the passage of the sheet; sustaining-bars for sustaining the paper after the depression of the tapes; a stop, G ; a registering-point, L , arranged to operate upon a slit in the paper; a slide, L^3 , for carrying said point; a pivot, L , for allowing the said point to swing with a folding movement of the paper; the guide, L^8 , for carrying said slide; means for reciprocating said slide in proper time to operate upon said slit; and means for moving said stop away from the incoming sheet during the registering movement of the sheet.

28. In a paper-folding machine, the combination with the fold-rolls; conveying-tapes for conveying the paper over said rolls in a direction parallel to the axes of said rolls; a point device arranged to act upon the slits in the sheets of paper fed to said machine; a pivot for allowing said point device to swing with said paper during a folding movement of the paper; and means for adjusting said point device in a direction transversely to the incoming movement of the sheet.

In testimony whereof we affix our signatures in presence of two witnesses.

WELLINGTON DOWNING.
FREDRICK H. WENDT.

Witnesses:

M. BURY,
H. C. LORD.