

No. 839,046.

C. A. STURTEVANT.

PATENTED DEC. 18, 1906.

DEVICE FOR PERFORATING OR SLITTING SHEETS OF PAPER AND FOLDING THE SAME.

APPLICATION FILED DEC. 29, 1904.

2 SHEETS—SHEET 1.

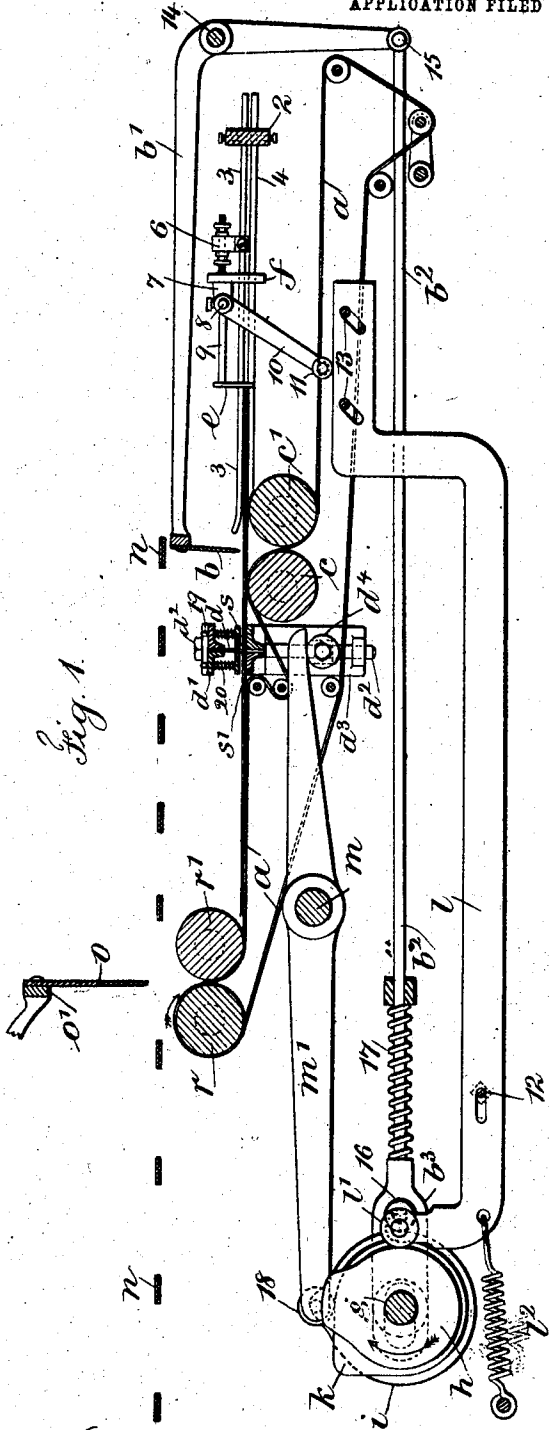


Fig. 1.

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Joseph Lee.

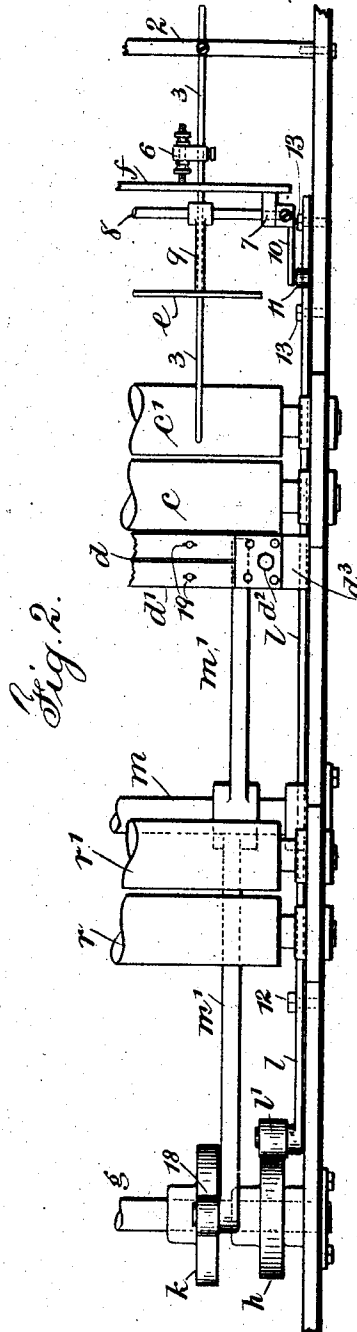


Fig. 2.

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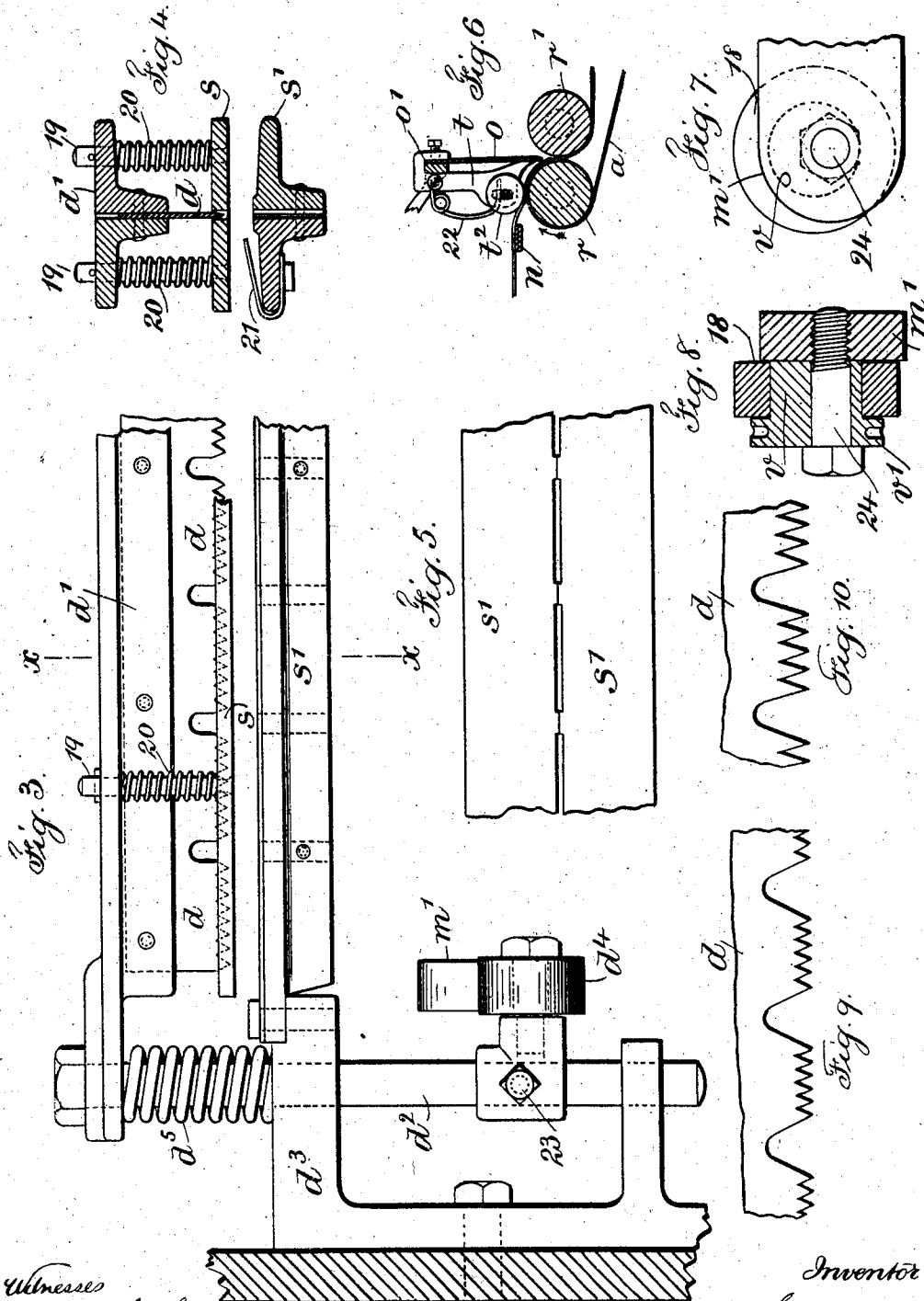
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DEVICE FOR PERFORATING OR SLITTING SHEETS OF PAPER AND FOLDING
THE SAME.

APPLICATION FILED DEC. 29, 1904.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CHARLES A. STURTEVANT, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO
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DEVICE FOR PERFORATING OR SLITTING SHEETS OF PAPER AND FOLDING THE SAME.

No. 839,046.

Specification of Letters Patent.

Patented Dec. 18, 1906.

Application filed December 29, 1904. Serial No. 238,727.

To all whom it may concern:

Be it known that I, CHARLES A. STURTEVANT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Devices for Perforating or Slitting Sheets of Paper and Folding the Same, of which the following is a specification.

My invention relates to a machine for perforating and folding sheets of paper and forming signatures for books, magazines, and pamphlets.

Heretofore successive sheets have been moved along to a stop and perforated, then folded along the line of perforation, and in connection therewith a stripper has been employed to remove the sheets from the perforators. In these instances the several devices have been associated in such close relation as to interfere with the full performance of the several functions. In my improved machine the sheets are moved into the machine against a stop and perforated or slitted upon a line to be folded. They are then moved along and stopped and thereafter folded on the line of perforations or slits. They may first be folded and then perforated upon a line, to be given a second fold, if desired.

I provide a folding-blade and folding-rollers, a vertically-movable or reciprocating perforating or slitting mechanism which, with its actuating devices, are independent of the folding-blade and its actuating devices, the respective actuating devices being oppositely disposed and arranged to operate at different times, and I also employ a shaft and means common to such shaft for operating the folding-blade and the slitter or perforator.

In the drawings, Figure 1 is a vertical longitudinal section and partial elevation of the essential features of a machine constructed according to my invention. Fig. 2 is a plan at one side of the machine and of the essential parts shown in Fig. 1. Fig. 3 is an elevation and partial section, in larger size, of the slitting or perforating devices. Fig. 4 is a cross-section at $x-x$ of Fig. 3. Fig. 5 is a plan of a portion of the slotted bed. Fig. 6 is a diagrammatic cross-section illustrating a modification. Fig. 7 is an elevation, and Fig. 8 a cross-section, of a device for varying the

length of the slits formed in the paper; and Figs. 9 and 10 are elevations of parts of perforating-blades of modified form.

a represents one of a series of tapes adapted for moving the sheet into the machine to be perforated and folded. b is a folding-blade. c c' are folding-rollers, over one of which and under the other of which the said tapes a pass. These tapes also extend back and forth over rollers, such as are shown in Fig. 1, according to the desired direction of travel and the parts that have to be passed or avoided.

d is a perforating-blade preferably mounted on a head d' , which may, as shown in Fig. 4, be made of two similar parts, between which the blade d is securely fastened.

At the respective ends of the head d' there are guide-arms d^2 , vertically movable in brackets d^3 , secured to the frame of the machine, and each guide-arm d^2 carries a bracket and roller d^4 . I have shown but one bracket d^3 and one guide-arm d^2 . The same, however, are duplicated at the opposite side of the machine. Associated with this perforating or slitting blade d is a presser-plate s and slotted bed s' , guide-rods 19 being provided and secured to the presser-plate s , extending upward freely through the head d' , there being pins through said rods above the head and springs 20 between the head and the presser-plate s , so as to maintain the head and the perforating-blade with reference to the presser-plate s in about the position shown in Fig. 4. The said slotted bed s' has a raised central portion against which the paper sheets are nipped by the presser-plate s , and I provide at intervals, if desired, one or more springs 21, secured to the under surface of slotted bed s' , extending around the one edge and lying adjacent to the lower upper surface of the slotted bed and performing the function of raising the paper slightly off the bed after being slitted or perforated. This bed s' , like the head d' , is preferably and advantageously made in two parallel parts connected together with bolts or rivets, because the perforating-blade d is at intervals provided with deep notches, the perforating-teeth being in sections adapted to pass down into the adjoining slots of the said bed s' . (See Figs. 3, 4, and 5.) The bed s' is secured to the bracket d^3 .

e is a movable stop, and *f* a fixed stop.

2 is a fixed beam connected to the frame of the machine and in turn supporting parallel series of rods 3 4 secured thereto.

5 6 represents an adjustable clamp device secured to one of the upper of the series of rods 3 and having one or more parts extending therefrom to connection with the fixed stop *f*. This stop *f* while nominally fixed is by virtue of its connection with the clamp 6 slidably adjustable on the rods 3 and 4, so that it can be moved nearer to the perforating or slitting blade or nearer to the beam 2. The stop-plate *f* carries one or more brackets 7, in which is a shaft 8, and upon the shaft one or more arms 9, that extend out to connection with the movable stop *e*, whereby when the stop-plate *f* is moved the stop *e* is also moved with it to a corresponding extent.

20 On the shaft 8, and preferably at one end, is a crank 10, on the free end of which is a roller 11. I provide a shaft *g* in the machine upon which are cams *h*, *i*, and *k*, having varying cam-faces and positioned for actuating the respective parts—that is, the perforating or slitting devices, the folding-blade, and the movable stop. I provide an arm *l* with offset ends, and in said arm there are slots, and in the slots pins 12 and 13, which are preferably connected to one frame of the machine on the inner surface and serve not only to support the arm *l*, but to provide for the longitudinal movement of the same and a rising movement to one end thereof, and it will be noticed that the slot of the arm which carries the pin 12 is horizontally placed—that is, in line with the arm—while the slots in which are the pins 13—that is, the slots in one raised end of the arm—are inclined, so that with the longitudinal movement of said arm a rising movement is given to this end which acts upon the roller 11, bearing on the surface thereof and at the same time acts upon the crank 10 to swing the shaft 8 and arm 9, and so raise the movable stop or plate *e*. This arm *l* carries a roller *l'* on the opposite end, bearing against the cam *h*, and there is connected to said arm a spring *l''*, the other end of which is secured to a post of the machine, the function of the spring being to keep the roller *l'* at all times against the surface of the cam *h*, and the function of the cam *h* is to impart to said arm *l* the longitudinal movement just described.

55 The folding-blade *b* is connected to the free end of one or more rocker-arms *b'*, which are pivotally mounted upon a shaft 14 in the frame of the machine. To the opposite ends of the rocker-arms *b'* is secured a connecting-rod *b''* at a pivot-pin 15. The end of the connecting-rod *b''* adjacent to the shaft *g* carries a yoke *b'''*, spanning the shaft *g*, and this yoke is provided with a roller 16, which bears on the surface of the cam *i*. A spring 17 or equivalent spring or device is employed for

keeping the roller 16 against the surface of the cam *i*. With the revolution of the shaft *g* and the cam *i* the rod *b''* is given a reciprocating movement, swinging the rocker-arm *b'* and raising and lowering the folding-blade *b*, so as thereby to carry the sheet or sheets down into the bite of the rollers *c c'*.

I provide a shaft *m* in the frame of the machine, on which is mounted a rocker-arm *m'* at one end, carrying a roller 18, which bears upon the surface of the cam *k*, the other end of the rocker-arm coming above the roller *d'*, which is connected to the guide-arms *d''* of the perforating or slitting blade. It will be apparent that I must employ guide-arms *d''* in brackets *d'''*, one at each side of the machine and connected to the ends of the head *d'* with springs *d''''* and rollers *d'''''*, and that to act evenly and pull down the entire head uniformly the rollers *d'''''* must be pressed downward by an arm *m'* at each side of the machine. I have only shown one arm *m'* upon the shaft *m*; but it is obvious that another arm, such as *m'*, must be employed at the other side of the machine, secured to this shaft, even if it only extends from the shaft *m* to a second roller, such as *d'''''*. With the rotation of the shaft *g* and cam *k* the rocker-arm *m'* is actuated and in turn bears down the guide-arms *d''*, the head *d'* and the perforating or slitting blade *d* acting upon the rollers *d'''''* against the tension of the springs *d''''*, which intervene between the bracket *d'''* and the portion of the head *d'* to which the upper ends of the guide-arms *d''* are connected, and in this downward movement the perforating or slitting blade passes through the paper to perforate or slit the same. The first movement, however, of these parts brings the presser-plate *s* down upon the paper against the raised portion of the slotted bed *s'*, so as to hold the paper firmly in position, and the further movement causes the head *d'* and blade *d* to pass down and perforate the paper, putting the springs 20 under tension and the serrated sections of the blade *d* passing into the slots of the slotted bed *s'*. As the cam *k* rotates the springs *d''''* raise the arms *d''* and the head *d'*, withdrawing the perforating or slitting blade *d* from the paper, the presser-plate *s* at this time acting as a stripper to insure the removal of the perforating-blade from contact with the paper, and with the last movement of these parts the presser-plate also rises and the springs 21 move up to lift the paper, the parts returning to the initial position. (Shown in Figs. 3 and 4.)

In the operation of the parts hereinbefore described the sheet or sheets of paper pass into the machine from the tapes *a* and come against the stop *e*. The cam *k* and the rocker-arm *m'* then actuate the perforating devices to perforate or slit the paper, as hereinbefore described, and as these are re-

leased the cam *h* actuates the arm *l*, the crank 10 to raise the stop *e* and permit the tapes in their further movement to progress the sheet or sheets to the fixed stop or plate *f*, the sheet in so doing passing between the series of rods 3 4. The distance that the stop *e* is from the stop *f* agrees exactly in the machine with the distance from the perforating-blade *d* to the folding-blade *b*, and the adjustability provided for the plates *f* and *e* by means of the clamp structure 6 is for sheets of varying sizes, so as to cause the perforations and fold to be at the desired intermediate point of the sheet. The parts are so placed and timed that immediately that the sheet comes into contact with the fixed stop *f* the cam *i* actuates the rod *b*², rocker-arm *b*¹, and folding-blade *b*, bringing the latter down upon the sheet at the previously-made line of perforations or slits, so as to bring the sheet down into the bite of the rollers *c c'* and fold the same on the line of perforations.

I have shown in Fig. 1 and may prefer to employ a series of tapes *n*, a folding-blade *o*, and folding-rollers *r r'*, so as to first fold the sheet before the same is perforated, when the line of perforations should be parallel with the fold and at the desired intermediate point of the sheet. With these latter devices the sheet will be folded on a line agreeing with its line of movement. It will be noticed from the drawings and the foregoing description that the perforating or slitting devices are independent of the folding-blade and also of the folding-rollers, and that the devices for actuating the perforating or slitting mechanism are also independent of the devices for actuating the folding-blade, and that the respective actuating devices are oppositely disposed with reference to the position of the folding-blade and the adjacent perforating or slitting devices, and also that these devices are arranged to operate at different times. It will also be noticed that the initial devices for actuating the slitting or perforating mechanism and the folding-blade are common to the shaft *g* and that the said shaft as a prime mover effects or provides for the operation of the various devices.

In the modification, Fig. 6, I have shown a frame *t*, carrying a roller or rollers *t*² and spring or springs 22. This frame *t* is adapted to fit over the beam *o'*, carrying the folding-blade *o*, and to be clamped thereto by the bolt shown. In this manner the folding-blade *o* is employed as a deflecting-blade, the same rising-and-falling movement being imparted thereto when carrying the frame *t*. These are employed in connection with the rollers *r r'* (shown in Fig. 1) and with at least so much of the series of tapes *n* (shown in Fig. 1) as extend at the left hand of the rollers *r r'*. This structure performs the

function of bending down one edge of each half-sheet of paper and advancing the same into the bite of the rollers *r r'*, between which rollers each sheet passes along the tapes *a* beneath the perforating or slitting devices to the movable stop *e* for the performance of the operations hereinbefore described, it being the intention with reference to this modified structure of lowering the same bodily from an initial raised position as each half-sheet comes into position. As a means of adjusting the slitting-teeth with relation to the said support for the paper, whereby the length of the slits formed in the paper may be varied by the perforating or slitting blade, I make the bracket of the roller *d*² movable on the guide-arm *d*² and secure the same by a bolt 23, which provides for clamping the same in place as shifted and adjusted. I prefer, however, to provide the roller 18 at the end of the lever *m'*, and which is acted upon by the cam *k*, with a tap-bolt 24 in a bushing *v* in said lever, and through which the bolt 24 passes eccentrically for clamping the parts, and a disk *v'* as a part of the bushing and by which it is turned as desired to change the extent of movement of the perforating-blade. This perforating-blade *d* may be made with spaced-apart series of short teeth, as shown in Fig. 3, with spaced-apart series of short teeth with inverted-V-shaped divisions, as shown in Fig. 9, or with spaced-apart series of long teeth, as shown in Fig. 10, all of which are adapted for the performance of the same function—viz., varying the length of the slits formed in the paper by the perforating or slitting blade.

I claim as my invention—

1. In a folding mechanism, the combination with means for producing two successive parallel folds in a sheet or sheets, of means for perforating the sheet or sheets through the superposed plies on the line which becomes the second fold-line.

2. In a folding apparatus, the combination with a set of folding devices, of perforating devices, means for operating the perforating devices to produce a line of perforations through the superposed plies parallel to the line of fold produced by the folding devices, a second set of folding devices, and means for operating said folding devices to produce a fold along the line of perforations.

3. In a sheet-folding machine, the combination of a perforating device constructed to produce a row of perforations in a sheet, a folding device constructed to fold the sheet along said row of perforations and arranged parallel to said perforating device, and means for moving the sheet successively to said perforating and folding devices, substantially as set forth.

4. In a sheet-folding machine, the combination of a perforating device constructed to produce a transverse row of perforations in a

sheet at one operation, a folding device arranged parallel to the perforating device and constructed to fold the sheet along said row of perforations, and means for moving the sheet forward intermittently in the same direction and presenting the sheet successively to said perforating and folding devices, substantially as set forth.

5. In a sheet-folding machine, the combination of a perforating device constructed to produce a row of perforations in a sheet with one operation, a folding device constructed to fold the sheet along said row of perforations and arranged parallel to said perforating device, and means constructed and operating to first move the sheet to and arrest the same in position to be operated on by said perforating device and then advancing the sheet in the same direction and again arresting the same in position to be operated on by said folding device, substantially as set forth.

6. In a paper-folding apparatus, the combination with a folding blade and rollers, of vertically - reciprocatory slitting mechanism independent of the folding-blade, guides for said slitting mechanism, and oppositely-disposed means for operating the folding-blade and slitting mechanism at different times.

7. In a paper-folding apparatus, the combination with the folding blade and rollers, of vertically-reciprocatory slitting devices, guides therefor, said slitting mechanism being independent and separated from the folding-blade and movable at a different time, a shaft, and means common to said shaft for operating the folding-blade and slitter, as set forth.

8. In a paper-folding apparatus, the combination with the folding blade and rollers, of a series of slitting-teeth arranged in several groups parallel to the said folding mechanism, and means for actuating the same whereby the paper is partially severed along the line of fold by the formation of several series of adjoining slits, the series being divided by intervening spaces of paper of greater width than the width of the paper left between the adjoining slits in each series of perforations.

9. The combination with a folding-blade and cooperating folding means, of a second folding-blade and cooperating folding means, said blades and cooperating devices being arranged to produce successive parallel folds, means for perforating the product through the superposed plies after the first folding-blade has acted and along the line which is to form the second fold-line.

10. In a paper-folding apparatus, the combination with the folding blade and rollers, of paper-slitting mechanism arranged substantially parallel to said folding mechanism and independent of the folding-blade to move in a plane parallel therewith and in advance thereof, means for actuating the same,

means for supporting the paper against the action of said slitting mechanism, and means for adjusting said slitting mechanism with relation to said means of support for the paper whereby the length of the slits formed in the paper may be varied, substantially as set forth.

11. In a paper-folding apparatus, the combination with the folding blade and roller, of a series of slitting-teeth arranged substantially parallel to said folding mechanism and independent of the folding-blade to move in a plane parallel therewith and in advance thereof, means for actuating the said series of slitting-teeth, means for supporting the paper against the action of said series of slitting-teeth, and means for adjusting said slitting-teeth with relation to the said support for the paper, whereby the length of the slits formed in the paper may be varied, substantially as set forth.

12. In a paper-folding apparatus, the combination with the folding blade and rollers, of a cross-head, a blade having slitting-teeth, a presser-plate and springs and means for operating the cross-head, substantially as and for the purposes set forth.

13. In a paper-folding apparatus, the combination with the folding blade and rollers, of a cross-head, a blade having slitting-teeth, a presser-plate, springs and a rest or support-blade, substantially as and for the purposes set forth.

14. In a paper-folding apparatus, tapes for moving each sheet into the machine, and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising said stop to permit a further movement of the sheets, and a second stop for arresting the same, and a folding blade and rollers for folding the sheet on the line of perforations.

15. In a paper-folding apparatus, tapes for moving each sheet into the machine, and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising said stop to permit a further movement of the sheets, a second stop for arresting the same, a folding blade and rollers for folding the sheet on the line of perforations, the parts being so arranged that the distance from the perforating and slitting devices to the folding-blade agrees exactly with the distance between the said stops.

16. In a paper-folding apparatus, tapes for moving each sheet into the machine and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising the said stop to permit a further movement of the sheets, a second stop for arresting the same, a folding blade and rollers for folding the sheet on the line of

perforations, and means for supporting and for adjusting the said stops in their parallel position with reference to the folding-blade.

17. In a paper-folding apparatus, tapes for moving each sheet into the machine and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising the said stop to permit a further movement of the sheets, a second stop for arresting the same, a folding blade and rollers for folding the sheet on the line of perforations, the parts being so arranged that the distance from the perforating and slitting device to the folding-blade agrees exactly with the distance between the said stops, and means for supporting and for adjusting the said stops in their parallel position with reference to the folding-blade.

18. In a paper-folding machine and in combination with folding devices, tapes for bringing the sheets progressively into the machine, a stop for arresting their movement, a presser-plate and bed between which the arrested sheets are held, perforating devices for slitting the sheets in the operation of which the presser-plate becomes a stripping device, supports for guiding and in which the said perforating-blade and presser-plate are moved vertically, a shaft, a cam on said shaft and a rocker-arm for imparting said vertical reciprocatory movement.

19. In a paper-folding apparatus, a series of tapes upon which the sheets are brought into the machine, a perforating-blade and means for operating the same for perforating or slitting the sheets, a movable stop against which the sheets are arrested before being perforated, a series of rods adjacent to said stop between which a portion of each sheet is received, a slidably-adjustable and nominally-fixed stop against which the sheets are arrested when the movable stop is raised and the sheets progressed, folding-rollers and a folding-blade parallel with perforating-blade for folding the sheet on the line of perforations.

20. In a paper-folding apparatus, a series of tapes upon which the sheets are brought into the machine, a perforating-blade and means for operating the same for perforating or slitting the sheets, a movable stop against which the sheets are arrested before being perforated, a series of rods adjacent to said stop between which a portion of each sheet is received, a slidably-adjustable and nominally-fixed stop against which the sheets are arrested when the movable stop is raised and the sheets progressed, folding-rollers, a folding-blade parallel with the perforating-blade for folding the sheet on the line of perforations, the said movable stop being supported by the slidably-adjustable stop, both of said parts being in a fixed relation to one another, and an adjustabale clamp upon said rods

which may be moved to alter the position of said stops for sheets of varying widths.

21. In a paper-folding apparatus, the combination with the series of tapes on which the sheets are progressively fed into the machine, a movable stop against which they are arrested, a support, a shaft connected thereto and arms from the shaft to the said movable stop, a crank upon said shaft, a prime-mover shaft, and a cam thereon, and a longitudinally-movable device acting upon said crank to raise the movable stop, substantially as set forth.

22. In a paper-folding apparatus, the combination with the series of tapes on which the sheets are progressively fed into the machine, a movable stop against which they are arrested, a support, a shaft connected thereto, arms from the shaft to the said movable stop, a crank upon said shaft, a prime-mover shaft and a cam thereon, a longitudinally-movable device acting upon said crank to raise the movable stop, a vertically-movable perforating or slitting device for slitting the sheets when their movement is arrested by the movable stop and a folding-blade parallel therewith for folding the sheets, and rollers for receiving the folded sheets when their movement is advanced to the support of the movable stop.

23. In a paper-folding apparatus, a series of tapes on which the sheets are progressively brought into the machine, a pair of rollers and means for bending down or deflecting said sheet into the bite of said rollers, other series of tapes on which the said sheets are progressively advanced in the machine, a stop against which their forward movement is arrested, devices for perforating or slitting said sheets, means for actuating the same simultaneously with the arrested movement of the sheets, means for raising the said stop to permit the sheets to be advanced, a second stop against which their movement is arrested, a folding-blade parallel with the perforating and slitting devices and at a distance therefrom agreeing with the distance between the said stops, and folding-rollers into the bite of which the sheet folded on the line of perforations is brought by the folding-blade.

24. In a paper-folding apparatus, a series of tapes upon which the sheets are progressively brought into the machine, a pair of folding-rollers, a folding-blade for progressively folding the sheets in a direction agreeing with their line of movement, other series of tapes on which the said sheets are progressively advanced in the machine, a stop against which their forward movement is arrested, devices for perforating or slitting said sheets, means for actuating the same simultaneously with the arrested movement of the sheets, means for raising said stop to permit the sheets to be advanced, a second stop

against which their movement is arrested, a folding-blade parallel with the perforating and slitting devices and at a distance therefrom agreeing with the distance between the said stops and folding-rollers into the bite of which the sheet folded on the line of perforations is brought by the folding-blade.

25. In a paper-folding apparatus and in combination with folding devices, a head, a perforating-blade connected to said head, end guide-arms and brackets therefor, a slotted presser-plate normally parallel with the said head and through the slots of which the perforating-blade passes, a series of guide-rods 19 secured to the presser-plate and passing up through apertures in the head, pins through the rods for securing the same to the head, and springs around the rods between the head and the presser-plate, a slotted bed normally below the presser-plate and having a raised central portion, and a spring connected to the said slotted bed, substantially as set forth.

26. In a paper-folding apparatus and in combination with folding devices, a head *d'* formed of two similar parts riveted or secured together, a perforating-blade connected to said head, end guide-arms and brackets therefor, a slotted presser-plate normally parallel with the said head and through the slots of which the perforating-blade passes, a series of guide-rods 19 secured to the presser-plate and passing up through apertures in the head, pins through the rods for securing the same to the head, and springs around the rods between the head and the presser-plate, a slotted bed, formed of two similar parts secured together, normally below the presser-plate and having a raised central portion, and a spring connected to the said slotted bed, substantially as set forth.

27. In a paper-folding apparatus, tapes for moving each sheet into the machine, and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising said stop to permit a further movement of the sheets, a second stop for arresting the same, a folding blade and rollers for folding the sheet on the line of perforations, and devices for actuating the perforating and slitting mechanism, devices for actuating the folding-blade which are independent of the devices for actuating the perforating and slitting mechanism, said respective actuating devices being oppositely disposed and arranged to operate at different times.

28. In a paper-folding apparatus, tapes

for moving each sheet into the machine, and a stop against which the sheets come, a perforating and slitting mechanism for perforating the sheets after their movement is arrested, means for raising said stop to permit a further movement of the sheets, a second stop for arresting the same, a folding blade and rollers for folding the sheet on the line of perforations, devices for actuating the perforating and slitting mechanism, devices for actuating the folding-blade which are independent of the devices for actuating the perforating and slitting mechanism, said respective actuating devices being oppositely disposed and arranged to operate at different times, and a shaft, and means common to said shaft for operating both the aforesaid sets of means.

29. In a folding apparatus, the combination with a set of folding devices, of perforating devices, means for operating the perforating devices to produce a line of perforations through the superposed plies and parallel to the line of fold produced by the folding devices, devices for arresting the movement of the folded perforated sheet, a second set of folding devices and means for operating said devices to produce a fold along the line of perforations.

30. In a folding apparatus, the combination with a set of folding devices, of perforating devices, means for operating the perforating devices to produce a line of perforations parallel to the line of fold produced by the folding devices, a second set of folding devices parallel with the perforating devices but spaced apart therefrom, means for arresting the folded perforated sheet so that the line of perforations are beneath the folding means and means for operating the second set of folding devices to produce a fold along the line of perforations.

31. In a folding apparatus, the combination with a set of folding devices, of perforating devices spaced apart therefrom, parallel therewith and in advance thereof relatively to the line of movement of the sheet, means for operating the perforating devices to first produce a line of perforations, means for moving the sheet to bring the line of perforations beneath the folding devices and means for operating the folding devices to produce a fold along the line of perforations.

Signed by me this 27th day of December, 1904.

CHAS. A. STURTEVANT.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.