E. D. MILLER & J. GEDDES.

PAPER FOLDING MACHINE.

APPLICATION FILED JUNE 15, 1914. RENEWED APR. 25, 1916.

1,200,211.

Patented Oct. 3, 1916.

5 SHEETS—SHEET 1.

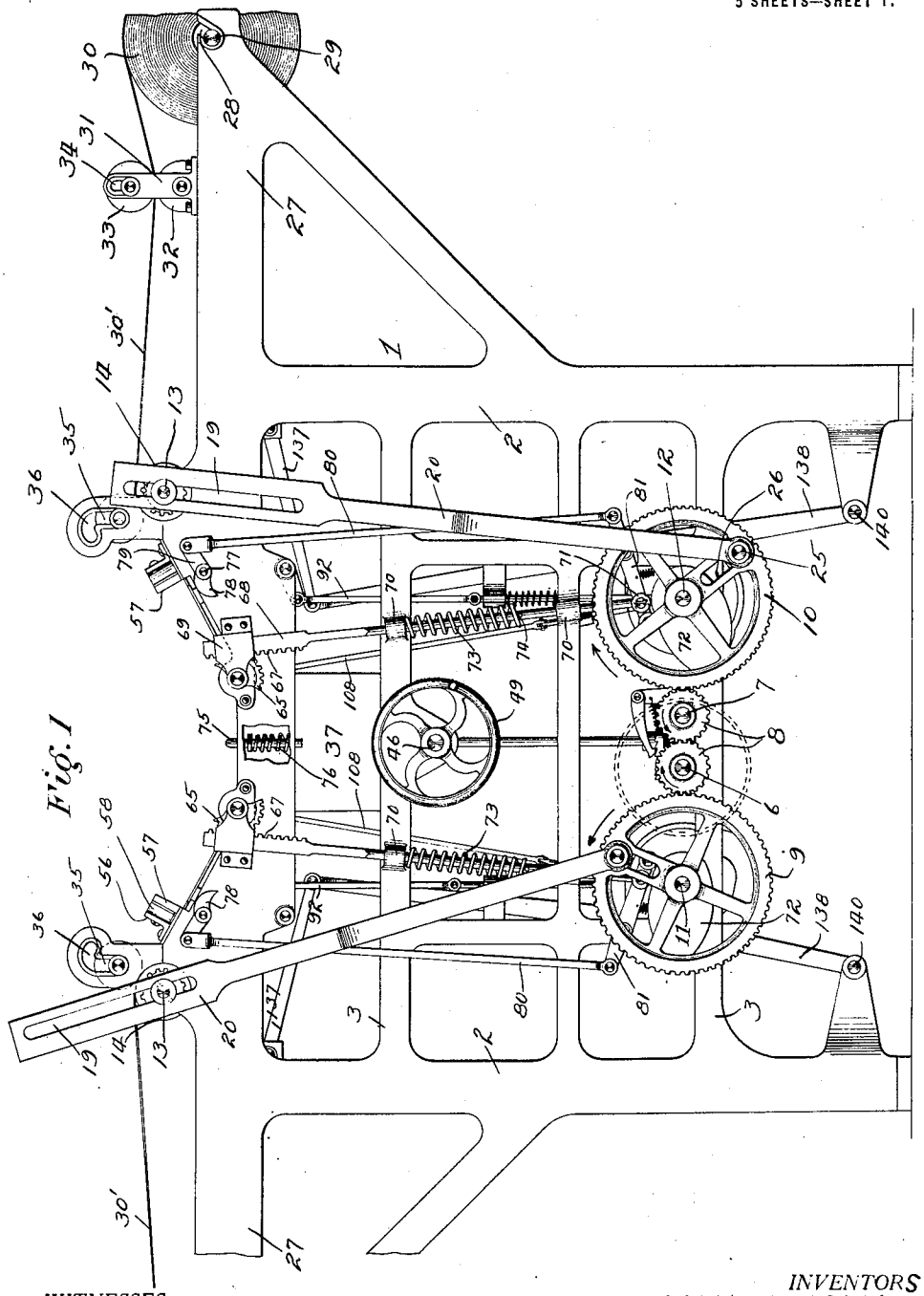


Fig. 1

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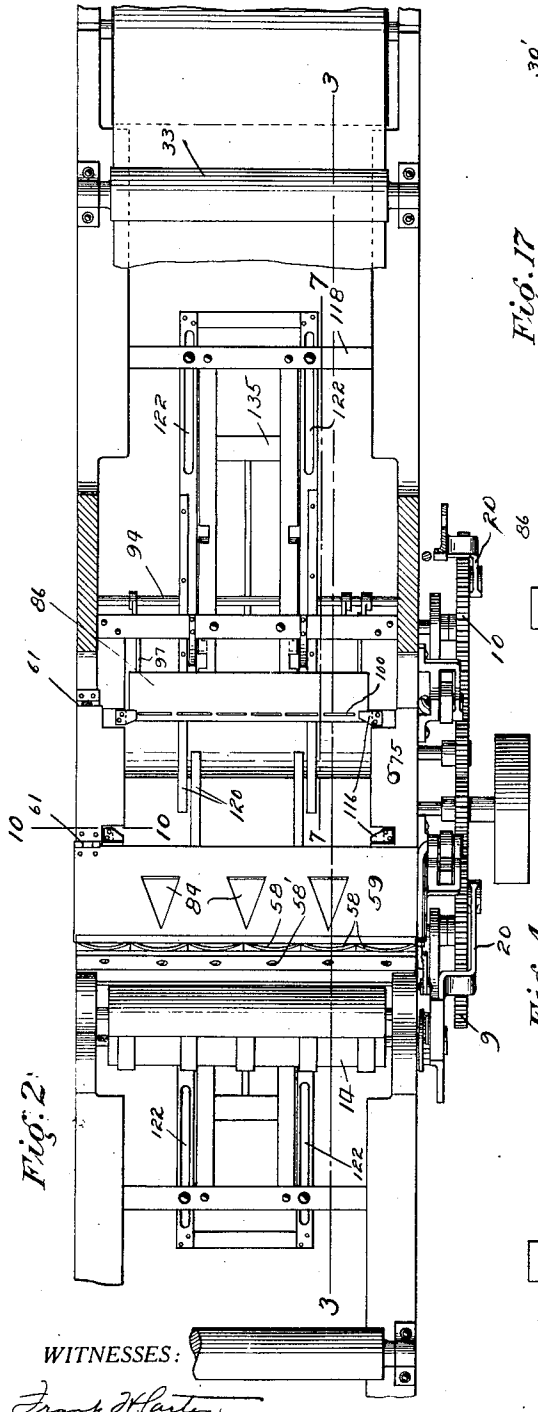


Fig. 2.

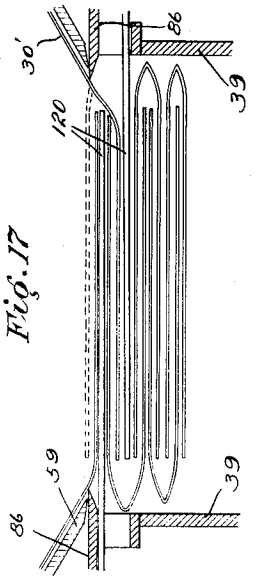


Fig. 17.

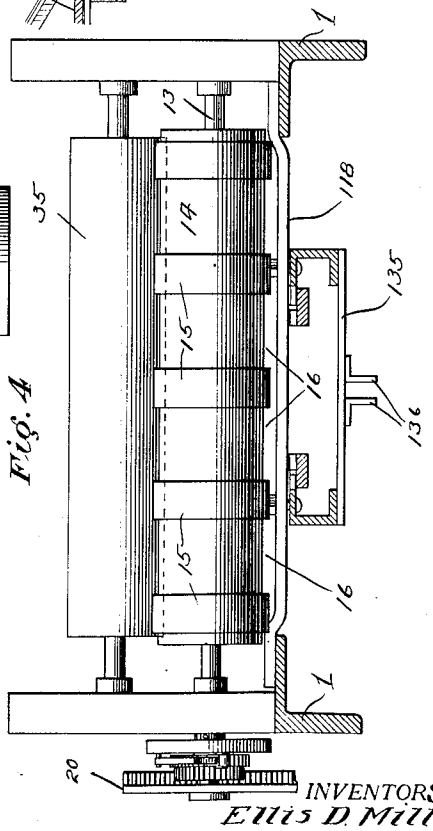


Fig. 4.

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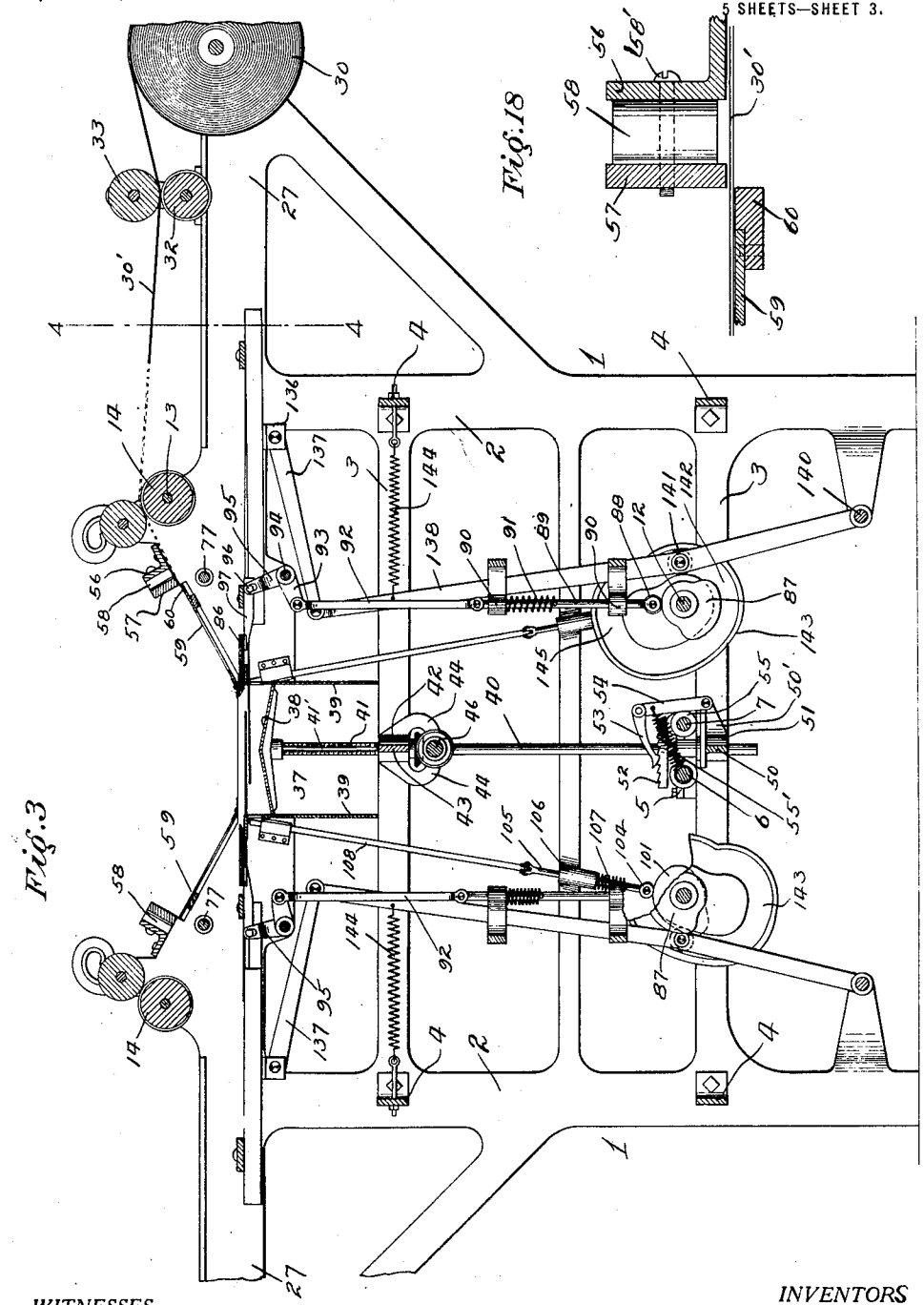


Fig. 3

Fig. 18

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Fig. 9

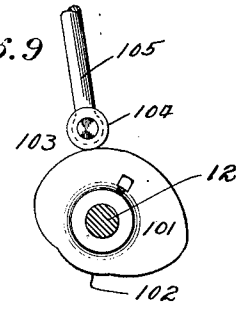


Fig. 5

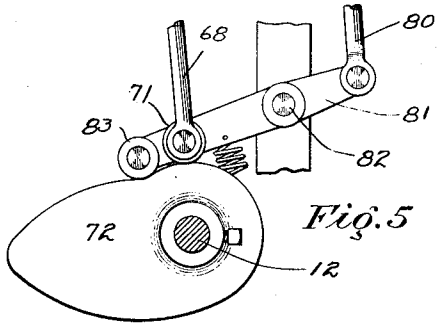


Fig. 19

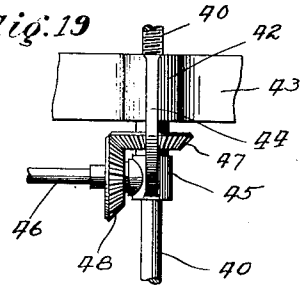


Fig. 6

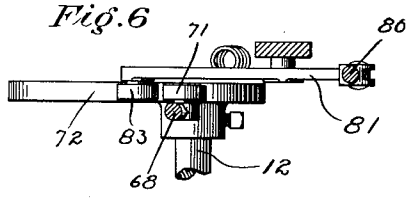


Fig. 7

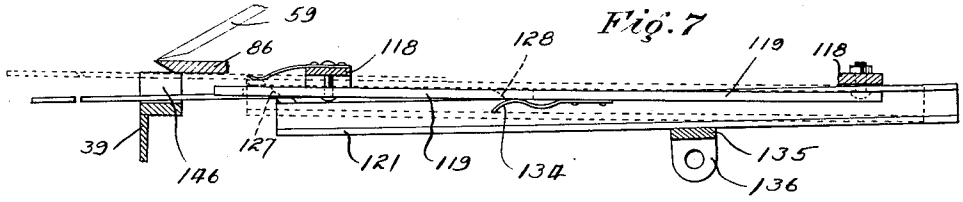


Fig. 8

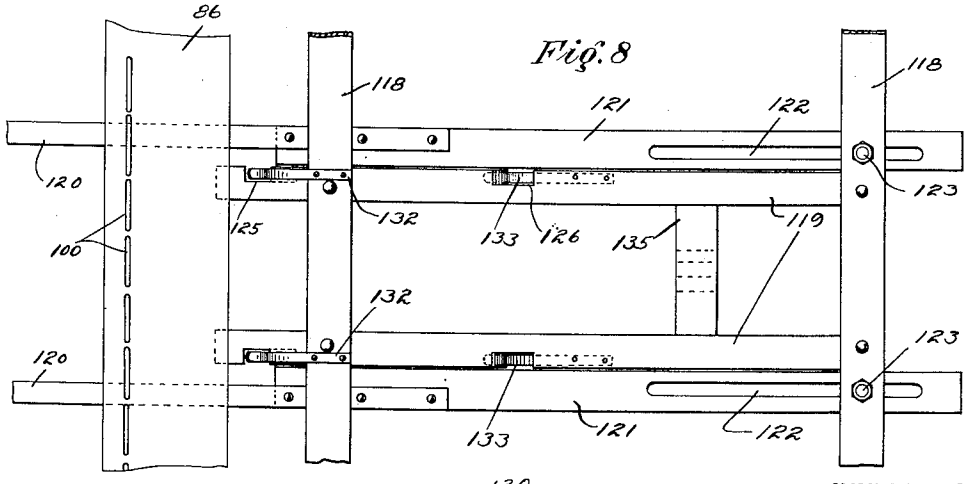
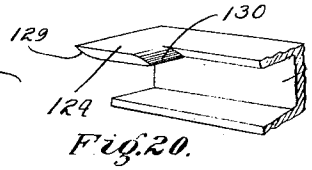


Fig. 20.



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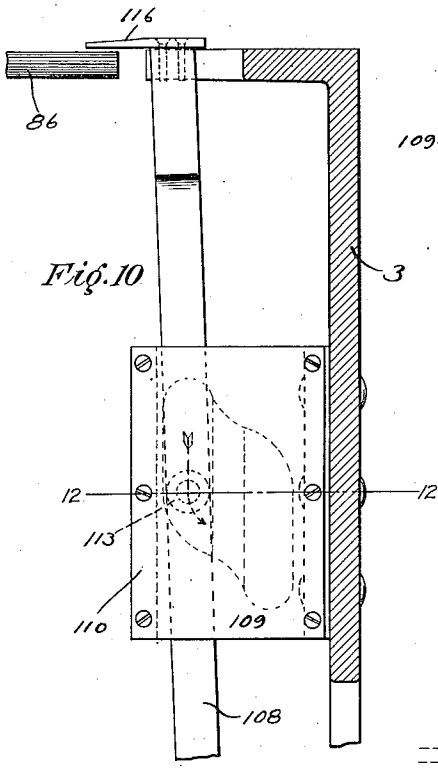


Fig. 10

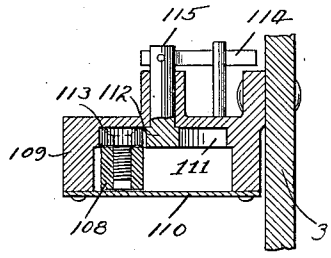


Fig. 12

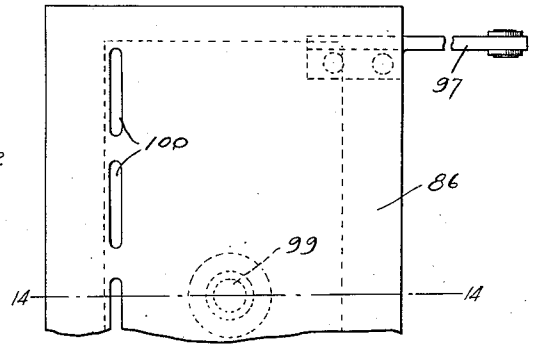


Fig. 13

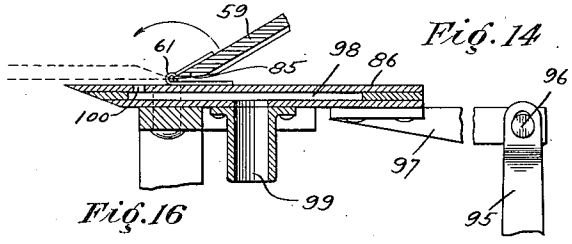


Fig. 14

Fig. 16

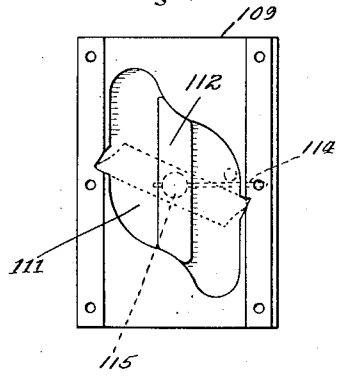


Fig. 11

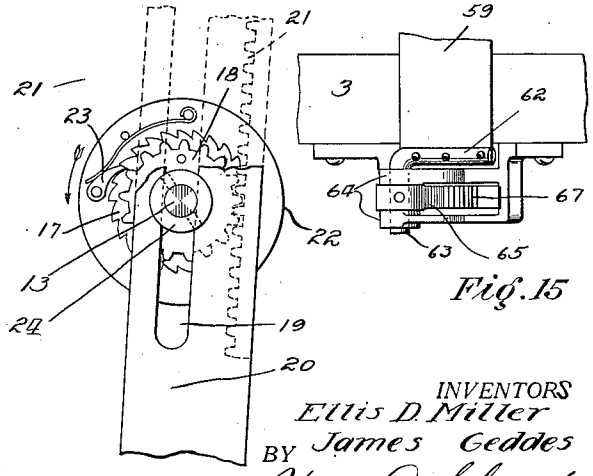


Fig. 15

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UNITED STATES PATENT OFFICE.

ELLIS D. MILLER AND JAMES GEDDES, OF SAN FRANCISCO, CALIFORNIA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO NATIONAL PAPER PRODUCTS COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PAPER-FOLDING MACHINE.

1,200,211. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed June 15, 1914, Serial No. 845,228. Renewed April 25, 1916. Serial No. 93,536.

To all whom it may concern:

Be it known that we, ELLIS D. MILLER and JAMES GEDDES, citizens of the United States, residing at San Francisco, in the county of San Francisco and State of California, respectively, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

This invention relates to folding machines and more particularly to a device for cutting off and folding rectangular sheets of paper so that each sheet is folded once making two leaves, between which is held one leaf of the sheet below and one leaf of the sheet above, or in other words, each sheet as it is cut off is folded in half with the half of the two adjacent sheets interfolded between.

The principal object of our invention is to provide an improved mechanism for accomplishing the above results, which will automatically cut off the rectangular pieces of paper from a continuous roll, feed, interfold, and stack the pieces thus folded.

Another object is to provide means for holding the paper while the same is being folded and for holding down the folded sheet while the next one is being fed.

Still another object is to provide means for holding the paper adjacent the line along which the fold takes place so as to prevent the elasticity of the paper from producing an irregular fold intermediate the edges thereof.

In general, the object of the invention is to produce an efficient automatic device for interfolding paper which is to be used with the improved receptacle described in the pending application filed May 16th, 1914, Serial Number 839,060.

With these and other objects in view, our invention consists in the novel construction, combination and arrangement of parts as herein described and as more specifically pointed out in the appended claims.

Reference should be had to the accompanying drawings forming a part of this specification wherein,

Figure 1 is a view in side elevation of the improved folding machine, showing in particular the mechanism for operating the paper feed rolls, the cutoff and folding plate. Fig. 2 is a plan view of the improved machine with certain parts removed on one side to show the interior mechanism thereof. Fig. 3 is a view in section along the line 3—3, Fig. 2. Fig. 4 is an enlarged view in section on the line 4—4 Fig. 3. Fig. 5 is an enlarged view in side elevation of the cam which operates the cut off and folding plate. Fig. 6 is a view in plan of the latter device. Fig. 7 is an enlarged view in side elevation on the line 7—7, Fig. 2. Fig. 8 is a view in plan of the same device as shown in Fig. 7. Fig. 9 is an enlarged view of one of the cams used to operate the holding down device. Fig. 10 is an enlarged view on the line 10—10, Fig. 2. Fig. 11 is a view of the cam used in this device with the cover plate removed. Fig. 12 is a view in section on the line 12—12 Fig. 10. Fig. 13 is a view in plan of the plates on which the paper is folded. Fig. 14 is a view on the line 14—14 Fig. 13. Fig. 15 is an enlarged top plan view of the bearing and guide means for the mechanism which operates the paper fold plate. Fig. 16 is an enlarged view in side elevation partly broken away showing the feed roll ratchet mechanism. Fig. 17 is a view in section showing the manner in which the paper is interfolded. Fig. 18 is an enlarged view in section showing the cut off knife. Fig. 19 is an enlarged view in side elevation of a certain portion of the mechanism for raising the bottom of the feed receptacle. Fig. 20 is a view in perspective of one end of the bar to which the holding down fingers are attached.

Referring to corresponding parts in the several views by the same numerals of reference, 1 denotes a frame composed of the uprights 2, various horizontal bars 3 and cross connecting members 4. The lower of the horizontal bars 3 is provided with bearings 5 in which is journaled the drive shaft 6, a shaft 7 being journaled on the opposite side of the center line of the machine and driven from shaft 6 through the medium of a pair of tooth gears 8, of the same size. These gears in turn drive the larger tooth gears 9 and 10 keyed upon shafts 11 and 12 respectively, which are journaled upon the same horizontal member on which the shafts 6 and 7 are supported. These latter shafts thus rotate in opposite directions as shown and while the drawings and the description is particularly directed to the right hand

side of the machine it will be understood that the opposite side is similar in construction, the same sequence of operations taking place only that they are a half cycle in advance of those described for the right hand side.

Suitably journaled in the upper portion of frame 1 is a shaft 13 to which is attached the feed roll 14 of some material having a certain degree of resiliency, and a frictional surface adapted to act upon the paper. We prefer to construct this roll with a series of circumferential bands 15 having grooves 16 therebetween in order to eliminate the chances of the paper clinging to the rolls as it passes between the same. These rolls are intermittently turned so as to feed the proper length of paper forward by means of the mechanisms shown in Fig. 16, consisting of a tooth ratchet wheel 17 and a tooth gear wheel 18 attached to each other and revolubly mounted on the shaft 13 on the outside of frame 1. Adjacent these wheels is a disk 22 keyed to the shaft and which carries a spring depressed pawl 23 adapted to contact with the teeth of ratchet wheel 17. The shaft 13 is extended to pass through a slot 19 in a connecting rod 20 and a collar 24 keyed to an outer end thereof forming with the surface of the gear 18 a guide for the upper end of the connecting rod. On one side of the upper end of the connecting rod is formed a toothed rack 21 adapted to engage the teeth of gear 18 and the lower end is pivotally mounted on a crank pin 25, which is radially adjustable in a slot 26 in one of the spokes of gear 10.

At each end of the machine, the frame is extended as shown at 27, and on the rear end thereof is provided an angular slot 28 adapted to receive a bar 29 on which the roll of paper 30 is revolubly held. Mounted on the upper edge of this extension between the slot 28 and the feed roll 14 is a bracket 31 in which is journaled a roller 32 and above this roller a similar roller 33, the latter having a slight vertical movement in a slot 34 in the upper end of the bracket. In like manner above the roller 14 is revolubly mounted a weighted roller 35, which is adapted to hold the paper upon the resilient surface of 14, this roller being so mounted that it may be readily lifted from the latter in order to allow the easy threading of the paper between the same.

The wheel 10 moves in the direction of the arrow, on Fig. 1 and the action of the feed device is as follows:—On the downward movement of the crank pin 25 and connecting rod 20 the rack 21 rotates the wheels 17 and 18 but not the disk 22 and the feed roll, as in this direction the pawl does not hold. On the upward stroke of the crank pin the wheels 17 and 18 are rotated in the direction of the arrow in Fig. 16 and the pawl engages the teeth of ratchet 17 causing the disk 22 and feed roller to be rotated therewith. This feeds the paper toward the center of the machine and the amount may be regulated by changing the position of pin 25.

The receptacle into which the folded paper is received is denoted by 37 and the bottom thereof consists of a plate 38 having the central portion higher than the edges in order to provide a greater space at the edges thereof to accommodate the greater thickness at the folded edges of the paper. This bottom is slidable within the side plates 39 and is carried on the upward end of a shaft 40, the said shaft being threaded as at 41 and provided with a longitudinal key way 41′, said threaded portion passing through sleeve 42, which is correspondingly threaded to receive the same. Sleeve 42 is held central between the side frame 1 by means of cross arms 43. This sleeve is provided with laterally and downwardly extending arms 44 connected to a bearing 45 for the horizontal shaft 46. The bearings 42 and 45 position a beveled gear 47 which meshes with a similar gear 48 keyed to shaft 46. The gear 47 is provided with a bore to fit the outside of the threads 41 and within the bore is provided with a spline or feather key adapted to slide in the key way 41′ so that the rotation of the gear causes a corresponding rotation of the shaft 40, which is raised or lowered in the threads of sleeve 42. Shaft 46 is extended through one side of the machine and there provided with a hand wheel 49, which is adapted to raise the bottom 38 to its uppermost position.

The bottom is lowered by the following mechanism:—Between the lower horizontal side bars 3 is a connecting bar 50, which contains a bearing 51 in alinement with the bearings 42 and 45 and in which the shaft 40 is slidably and revolubly mounted. Keyed to the shaft above this bearing by means of a spline is a face ratchet 52 adapted to be rotated by the pawl 53 pivotally mounted on the end of link 54. Mounted on shaft 7 is a small cam 55 adapted to contact with the link 54 intermediate its length, the lower end of the link being pivotally mounted in a bracket 50′ extending from 50. The link is held on the cam surface by a spring 55′ and the reciprocating motion thus imparted to the pawl 53 causes the latter to rotate the ratchet 52. Thus as the shaft 7 rotates the pawl moves ratchet 52 and the shaft 40, the threaded end of the latter rotating in the threaded sleeve 42 gradually lowers the bottom as the thickness of the paper increases.

The paper after being fed by rollers 14 and 35 passes under an angle 56 to which is attached a steel bar 57, forming one half

of a shear. This knife is adjustably held to the angle bar by means of arch shaped springs 58 and screws 58'. In passing out from under the shear plate 57 the paper is received on an inclined oscillating plate 59, provided on the upper edge with a companion shear blade 60 so that the upward movement of the latter cuts off the paper as it passes the plate 57. The plate 59 is pivotally mounted on one side as at 61 and on the other side as shown in detail in Fig. 15. As shown in this figure the edge of the plate 59 is provided with a reinforcing strip 62 of circular section, slotted to receive the plate and which strip is bent at right angles to form a shaft 63, which is journaled in bearings 64. Attached to the shaft 63 between these bearings is a segmental toothed gear 65 in mesh with a rack 67 on the upper end of a rod 68. The bracket 69 containing the bearings 64 is provided with a straight back to serve as a slide for this rack and takes care of the thrust produced by the gear 65. The rod 68 is slidably mounted in suitably disposed guides 70 and on the lower end thereof is a roller 71, which contacts with the surface of cam 72, which latter cam is keyed on shaft 12 inside of wheel 10. A spring 73 interposed between the lower side of the upper bearing 70 and a pin 74 in the rod 68 serves to hold this roller upon the cam 72.

It will be evident that as the cam rotates in the direction of the arrow in Fig. 1, the roller 70 will be lifted imparting to the shaft 63 and the attached plate 59 a counter clock-wise movement, this movement being sufficiently great to move the plate 59 to a horizontal position. The plate on its final movement makes contact with a pin 75 slidably mounted in the side member of frame 1 and which is urged upwardly by means of a spring 76 abutting against the frame and a collar on the pin.

As it requires considerable power to start plate 59 and effect the shearing of the paper, and as it is not desirable to transmit this power through the rod 68, the rack, and segmental gear to the plate 59, we provide additional means for causing preliminary movement of the said plate during this shearing operation. This means consists of a shaft 77 pivotally mounted in the frame 1 adjacent the shear bar 60 when in its normal position, which bar extends over each edge of the frame. Attached to this shaft in alinement with the extending edge of the shear bar is a cam 78 and also on one side an arm 79 to the end of which is pivoted a rod 80. The lower end of this rod is pivotally attached to the end of a rock arm 81 pivotally mounted intermediate its length to the frame 1 as shown at 82. This rock arm extends back of the roller 71 and ahead of the latter is provided with a pivoted roller 83, which contacts with the cam surface 72. This roller being placed ahead of the roller 71 will cause the rock arm 81 to move slightly in advance of the rod 68 and this movement pulls down rod 80, rotates shaft 77 and the cam 78 in a clock-wise direction and causes the latter to push up on the extended ends of the shear bar 60. This causes the latter to sever the paper and move past the lower edge of the companion shear bar 57 before the roller 71 comes into operation. When the latter comes into operation the movement is comparatively quick and the plate 59 is lifted from the cam 78 without much effort. Plate 59 is provided with a number of openings 84 and the lower edge thereof is beveled as shown at 85 in Fig. 14. The point of this beveled portion is in alinement with the axis of the pivot 61 and the shaft 63. The reciprocating platen on which the fold takes place is denoted by 86 and this platen is extended during the time of fold as shown in Fig. 14 and during certain other periods being drawn back as shown in Fig. 7. The mechanism for imparting the reciprocating movement to the platen consists of a cam 87, Fig. 3, which actuates a roller 88 pivotally mounted in the lower end of rod 89, the said rod being slidably mounted in guides 90 attached to the side of frame 1. Spring 91 interposed between the upper guide and a pin or shoulder on rod 89 holds the roller upon the cam. To the upper end of the rod 89 is pivotally attached a link 92, which in turn is pivoted to an arm 93 keyed to a shaft 94, the said shaft extending across the frame and being journaled on bearings on each side thereof. At suitable intervals on this shaft between the frame members are attached arms 95 bifurcated and slotted on the upper ends to engage pin 96 in a bar 97 attached to the rear end of the platen 86. Thus as the cam roller 88 is raised the platen will be pulled from the center of the machine, and when the roller drops back the platen will be extended from under the lower edge of plate 59.

The platen itself is constructed of several thicknesses of metal providing a chamber 98 therebetween from which chamber extends an outlet 99. Along the upper portion and at the front of the platen are provided a number of slotted openings 100 communicating with 98 and which when the platen is extended are outside of the beveled edge of plate 59. If the outlet 99 is connected to a suitable suction device the air drawn through these openings will hold the paper to the platen along the entire width thereof so that as 59 is rotated it is folded in a straight line.

In addition mechanical holding means is provided on each edge of the platen 86, which means are shown in detail in Figs. 9,

10, 11 and 12 inclusive. Cams 101 having two periods of rest as shown at 102 and 103 are mounted one on each side of the machine on shaft 12 and bearing on each of these cams is a roller 104 revolubly mounted on the lower end of rod 105. The latter rod is slidably mounted in a guide 106 and a spring 107 holds the roller on the cam. Pivotally attached to the upper end of rod 105 is a bar 108 having the axis of movement parallel to the axis of the shaft on which the actuating cam is mounted. The upper ends of the bars 108 extend through the guide blocks 109 attached to the side frame of the machine, the said guide blocks having a removable face plate 110. In the inner surface of these guide blocks is cut a switch cam 111 having the bar 112 pivotally mounted centrally thereof. The cams on the opposite sides of the machine are cut "right" and "left" but otherwise the construction is the same. The stud 115 attached to bar 112 extends through the back of the block and is there slotted to receive a flat spring 114 by which it is returned to its normal position. A roller 113 pivotally attached to the side bar 108 extends into the recess of the cam, and on the downward movement of this roller the switch bar 112 is rotated to the position shown in dotted lines in Fig. 11 to allow the rollers to reach the lowermost point of the cam. During the period in which the roller changes its direction of motion spring 114 acting on the stud brings this switch bar back to its normal position so that on the upward movement of the roller the latter is compelled to travel on the opposite side of the cam for a given distance when it again operates the switch bar and moves down on the first mentioned side of the cam. The period of rest provided by the curve 103 allows the roller to stop in the position shown in Fig. 10 in which position the upper end of bar 108 is in alinement with the upper surface of platen 86. Attached to the top of the bar is a thin plate 116 extending laterally on one side thereof and the paper is adapted to be gripped between the under surface of 116 and the upper surface of plate 86.

In order to hold the folded paper down after the same has been folded we provide certain movable fingers, which are shown in detail more specially in Figs. 4, 7 and 8. Cross-bars 118 are attached to the upper member of the side frame and rigidly attached to these members are two longitudinal bars 119. The fingers 120 which are adapted to extend over the receptacle 39 are attached to channel shaped members 121 in the upper flange of which is a slot 122 by which these members are slidably attached to the rear cross bars 118 by means of the bolts 123. Sufficient clearance is provided between the head of these bolts and the under surface of the bar to allow a slight rocking motion of the member 121. Adjacent the forward end of these members, as shown in detail in Fig. 20, is formed a laterally extending lug 124 having the inclined front and rear surfaces 129 and 130. The strips 119 are spaced from bars 118 a sufficient distance to allow this lug to move along the upper surface thereof and in the side of these bars adjacent the bars 121 are two notches 125 and 126, the forward notch 125 being provided on the rear with a downwardly curved surface 127, while the latter notch is provided on the forward side with an upwardly inclined surface 128. Mounted on bar 118 is a spring 132 having its forward end directly in line with the surface of bar 119 and above the opening 125, while on the under side of bar 119 is attached a spring 133 provided with a curved end 134 tangent to the under surface of this bar and directly under opening 126.

Connecting the lower flange of the slidable members 121 is a cross bar 135 provided with angle projections 136 in which is pivotally mounted a link 137 having its other end pivotally attached to a rock arm 138, the lower end of the latter being pivotally mounted on the frame as shown at 140. On one side of this rock arm intermediate the ends a roller 141 is pivotally mounted and is adapted to work in the groove 142 of the cam 143, mounted on shaft 12. Spiral spring 144 is attached to the rock arm and to the frame holding the cam roller against the outer surface of the groove and acting to draw the slidable frame away from the center of the machine.

In use when the plate 59 makes a fold the fingers 120 of the right hand side of the machine are in the position as shown in Fig. 3 and immediately after the fold is completed the cam roller engages the portion 145 of the cam groove moving the upper end of the rock arm to the right carrying with it the frame to which the fingers 120 are attached. The movement of this frame is such that the lugs 124 stop just under the notches 126 and as the lugs move along the under surface of 119 they are caught by the curved end of spring 133 and forced upwardly into this slot. When they move in the opposite direction or toward the left the curved forward end 129 engages the curved surface 128 and draws the lug upwardly and with it the fingers to the upper side of bar 119. At this time the fingers are completely drawn within slot 146, and as the frame and fingers move outwardly the latter is projected over the last folded sheet. When the forward slot 125 is reached the lug drops therein by the tension of spring 132; thus the fingers are lowered and the upper sheet held down while the next sheet is fed forward. On the return stroke the inclined surface 130 contacts with the surface 127 thus insuring that the lug returns along the under

side of 119. Thus, the fingers have more or less of a rectangular motion imparted to them.

As shown in the various figures the parts are positioned so that a fold is about to start on the right hand side of the machine and the sequence of operation is as follows:— Cam 72 contacts with roller 83, moving rock arm 81 pulling down rod 80 and rotating the cam 78. This moves the shear bar 60 a sufficient distance to pass the lower edge of the companion shear bar 57 thus cutting off the paper, which is denoted by 30'. When this operation has taken place the roller 71 is beginning to contact with the cam surface and the rod 68 is pushed upwardly causing the plate 59 to be rotated through the action of the rack 67 and the segmental gear 65. The plate 59 rotates until it assumes a horizontal position; thus the paper which was lying on the surface of this plate is folded to a horizontal position as shown in dotted lines in Fig. 17 and over the end of the sheet fed from the opposite side. While this plate is making its return stroke the cam 143 acts on roller 141 moving back the fingers 120 and at the same time cam 87 acts on roller 88 and through the connecting mechanism moves back the platen 86. When the latter is moved back the holding plate 116, which has been at rest on the upper surface of the platen, begins to move downwardly due to the circular portion 103 of cam 101 having passed the roller 104. During the time when the aforesaid operations have been taking place the connecting rod 20 has been practically stationary and when the shaft 12 has moved 90 degrees the connecting rod starts up and the paper feed takes place. The paper is fed over the sheet just folded and while the feeding takes place fingers 120 move out between the sheet being fed and the previously folded sheet. At the same time the rod 108 is moving upwardly in the side of the cam adjacent the frame 3 or away from the platen. The latter starts to move outwardly about the time the wheel 10 has moved 180 degrees at which time the fold on the opposite side of the machine takes place. When the shaft 12 has moved approximately 225 degrees the feed has finished, the guide fingers 120 and platen 86 are fully extended. Immediately after the platen has finished its movement the rod 108 with the holding plates 116 moves downwardly in the side of the cam away from the frame or next to the platen until they rest on the paper which has just been fed. The plates 116 rest on the platen without further motion due to the fact that the roller 104 rests in the circular portion 103 of the cam. The operations on the opposite side of the machine take place in the same sequence except that cam shaft 11 is timed 180 degrees from cam shaft 12. Thus first one side folds over the extending end of a sheet just fed from the second side. Another sheet is then fed from the first side when the sheet extending from the second side folds over inclosing the two leaves of sheets fed from the first side, this operation taking place alternately on opposite sides of the machine, each fold inclosing the ends of the next adjacent sheets. The bottom 38 moves down to accommodate the increased thickness of paper thus placed in the receptacle 37. When this receptacle becomes full the machine is stopped, the folded paper removed and the bottom run up to its upper position by means of hand wheel 49.

It will thus be seen that there has been provided a machine, which effectively and actively accomplishes the objects set forth in the beginning of this specification, and while we have shown the preferred embodiment of the invention it will be understood that changes may be made in form and proportion of parts, and minor details of construction without departing from the spirit of the invention.

What we claim as new and wish to cover by Letters Patent is:—

1. In a folding machine, a receptacle, paper folding means arranged on each side thereof, independent paper feeding means arranged on opposite sides of the receptacle for feeding separate lengths of paper from the opposing sides of the receptacle, the length of paper from one side being advanced toward and in overlapping relation to the length fed from the opposite side, means for severing the oppositely fed paper into lengths, a platen for each folding means movable into the receptacle beneath the paper and adjacent the folding means for supporting the paper during the folding thereof by the respective folding means, mechanism for removing the platens to permit of free entrance of the folded paper to the receptacle, and mechanisms for operating the folding means, severing means and platen on one side of the receptacle in alternative relation to the corresponding parts on the opposite side of the receptacle.

2. In a paper folding machine, a frame, a pivotally mounted fold plate having a shear edge and adapted to fold onto the frame, a relatively stationary shear edge arranged for co-action with the first shear edge, means for feeding paper between the shear edges, paper clamping means operable to hold the severed paper on the frame, and means for operating the fold plate during operation of the clamping means to fold the severed paper onto the frame.

3. In a paper folding machine, a frame, a pivotally mounted fold plate having a shear edge and adapted to fold onto the frame, a relatively stationary shear edge ar-

ranged for coaction with the first shear edge, means for feeding paper between the shear edges, paper clamping means operable to hold the severed paper on the frame during folding of the paper, a mechanism for operating the fold plate to have its shear edge coöperate with the second shear edge, and other mechanism for swinging the fold plate to fold the severed paper onto the frame.

4. In a paper folding machine, a frame, a platen thereon provided with a suction opening, mechanical clamping means on each side of the suction opening of the platen, the paper on the platen being retained thereon by the clamping means and suction created through the opening of the platen, means for operating the mechanical clamping means during the provision of a suction through the suction opening of the platen, and folding means operable to fold the paper onto the platen along the line defined by the paper retaining means.

5. A paper folding machine of the character described comprising alternately driven feed rolls located on opposite sides of the center thereof, said rolls being intermittently driven and adapted to feed the paper toward the center of the machine, shears adapted to cut off a sheet of the required length, oscillating plates adapted to fold the severed sheet over the unsevered sheet fed from the opposite side, a reciprocating platen on which the line of fold takes place, plates adapted to hold the paper on said platen while the fold is taking place and means for compressing the folded sheets.

6. A paper folding machine of the character described comprising feed rolls mounted on each side of the machine adapted to feed the paper from separate rolls toward the center of the machine, shears adapted to cut off the paper and oscillating plates adapted to fold the severed sheet over the unsevered sheet fed from the opposite side of the machine, movable platens on which the fold takes place, holding plates adapted to grip the paper between their under surface and the surface of said platen, a receptacle to receive the folded paper and fingers having a rectangular motion adapted to hold the folded paper in said receptacle.

7. A paper folding machine of the character described comprising feed rolls mounted on each side of the machine adapted to feed the paper from separate rolls toward the center of the machine, shears adapted to cut off the paper and oscillating plates adapted to fold the severed sheet over the unsevered sheet fed from the opposite side of the machine, a reciprocating platen, movable holding plates adjacent the edge of said platen adapted to hold the paper while the fold takes place, a receptacle to receive the interfolded paper, a movable bottom in said receptacle and means for lowering said bottom as the amount of folded paper increases and fingers adapted to compress the folded paper in said receptacle.

8. A paper folding machine of the character described comprising a frame, a receptacle for the folded paper in the center of said frame, feed rolls mounted in said frame on each side of said receptacle, pivotally mounted upwardly inclined fold plates leading from the upper edges of the sides of said receptacle and adapted for folding and delivering the folded paper to the receptacle, said fold plates swinging onto the frame to fold the paper thereon, a shear bar attached to the upper edge of each of said plates, means for oscillating said plates, a shear bar coacting with each of the first shear bars, the paper being adapted to be fed between said shear bars toward said receptacle and means for holding said paper on the frame while said plates are oscillating to fold the paper.

9. A paper folding machine of the character described comprising a frame, a receptacle adapted to receive the folded paper mounted in the center of the frame, feed rolls adapted to feed paper toward said receptacle from opposite sides thereof, inclined pivotally mounted fold plates over which the paper is fed for folding and delivering the paper to the receptacle, a shear bar attached to the upper edge of each of said plates, a companion shear bar for each first mentioned shear bar mounted adjacent to the path of the latter, the paper being fed between said bars, a cam shaft on each side of the machine, a cam acting on said first mentioned shear bar to cause the shearing operation of the latter, other means for causing the complete oscillation of said plate, and means for holding the paper while said plate is oscillating to fold the paper.

10. A paper folding machine of the character described comprising a frame, a receptacle for the folded paper in the center of said frame, feed rolls mounted in said frame on each side of said receptacle, a pivotally mounted upwardly inclined fold plate leading from the upper edges of the sides of said receptacle, a shear bar attached to the upper edges of said plate, means for oscillating said plate, a coacting shear bar, said feed rolls being adapted to feed paper between said shear bars over said plate, a reciprocating platen at the base of said fold plate, holding devices adjacent each side of said platen adapted to hold the paper thereon while the fold takes place, a guide cam for said holding devices to cause a lateral movement thereof and an operating cam for imparting a vertical movement to said holding devices.

11. A paper folding machine of the character described comprising feed rolls mounted on each side of the machine adapted to

feed the paper from separate rolls toward the center of the machine, shears adapted to cut off the paper, oscillating plates adapted to operate the shears and fold the severed sheet over the unsevered sheet fed from the opposite side of the machine, a receptacle arranged between the oscillating plates to receive the folded sheets, fingers extending across said receptacle adjacent the top thereof and means for causing a lowering of said fingers, their withdrawal from said receptacle and their reëntrance at a higher level.

12. A paper folding machine of the character described comprising feed rolls mounted on each side of the machine adapted to feed the paper from separate rolls toward the center of the machine, shears adapted to cut off the paper for folding, oscillating plates adapted to fold the severed sheet over the unsevered sheet fed from the opposite side of the machine, a receptacle to receive the folded sheets from said plates, a vertically disposed shaft centrally located under said receptacle, a bottom for said receptacle, pivotally mounted on the upper end of said shaft, a ratchet wheel mounted on a spline on said shaft, a pawl adapted to engage said ratchet and a cam adapted to oscillate said pawl, said shaft having threads adapted to engage a stationary similarly threaded member so that the rotation of said shaft lowers said bottom.

13. A paper folding machine of the character described comprising a frame, a receptacle adapted to receive the folded paper mounted in the center of the frame, feed rolls adapted to feed paper toward said receptacle from opposite sides thereof, inclined pivotally mounted fold plates over which the paper is fed, a shear bar attached to the upper edge of each of said plates, a companion shear bar for each first mentioned shear bar mounted adjacent to the path of the latter, the paper being fed between said bars, cams acting against the under side of said first mentioned shear bars adapted to move the same past the respective coacting shear bar, a toothed gear attached to the pivot of each plate, a toothed rack coacting with each gear, cam means operable to reciprocate the racks, and means connecting the cams acting on said shear bar with said cam means for operation in advance of the reciprocation of the racks.

14. In a paper folding machine, a frame, a pivoted folding plate thereon, a platen movable beneath the plate, said folding plate being adapted for swinging onto the platen to fold a paper thereon, paper clamping means associable with the platen for holding paper thereon during folding of the latter by the plate, means for feeding paper onto the platen, and mechanism for successively operating the folding plate to fold the paper, releasing the paper from the clamping means, and moving the platen beneath the folding plate.

15. In a paper folding machine, a frame, a receptacle thereon, a folding plate pivoted to the frame, a platen mounted on the frame for movement from under the plate to overlie the receptacle, said plate being adapted to swing onto the platen when in the latter position to fold thereon a paper, means for feeding paper onto the plate and platen, means for holding the paper to the platen during the folding of the paper, mechanism for swinging the fold plate to fold the paper on the platen, and other mechanism for releasing the paper and moving the platen from over the receptacle to permit of the paper dropping into the latter.

16. In a paper folding machine, a frame, a receptacle thereon, a folding plate pivoted to the frame, a platen slidably mounted on the frame for movement over the receptacle, means for operating the fold plate when the platen is over the receptacle to fold a paper on the platen, and other means for sliding the platen from over the receptacle to permit of the folded paper dropping into the receptacle.

17. In a folding machine, a frame, a receptacle thereon, means for folding paper and depositing the folded paper in the receptacle, and oppositely arranged means for holding the paper folded in the receptacle, each of the last means comprising a finger, a support for the finger having a laterally extending lug provided with front and rear inclined faces, a track for the finger support provided with cut-outs at the limits of travel of the latter to permit of the lug of the finger support passing from one side of the track to the other for providing movement of the finger longitudinal of the receptacle, and mechanism for operating the second means alternately.

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

ELLIS D. MILLER.
JAMES GEDDES.

Witnesses:
R. M. OYARZO,
W. A. STOCK.