

No. 689,862.

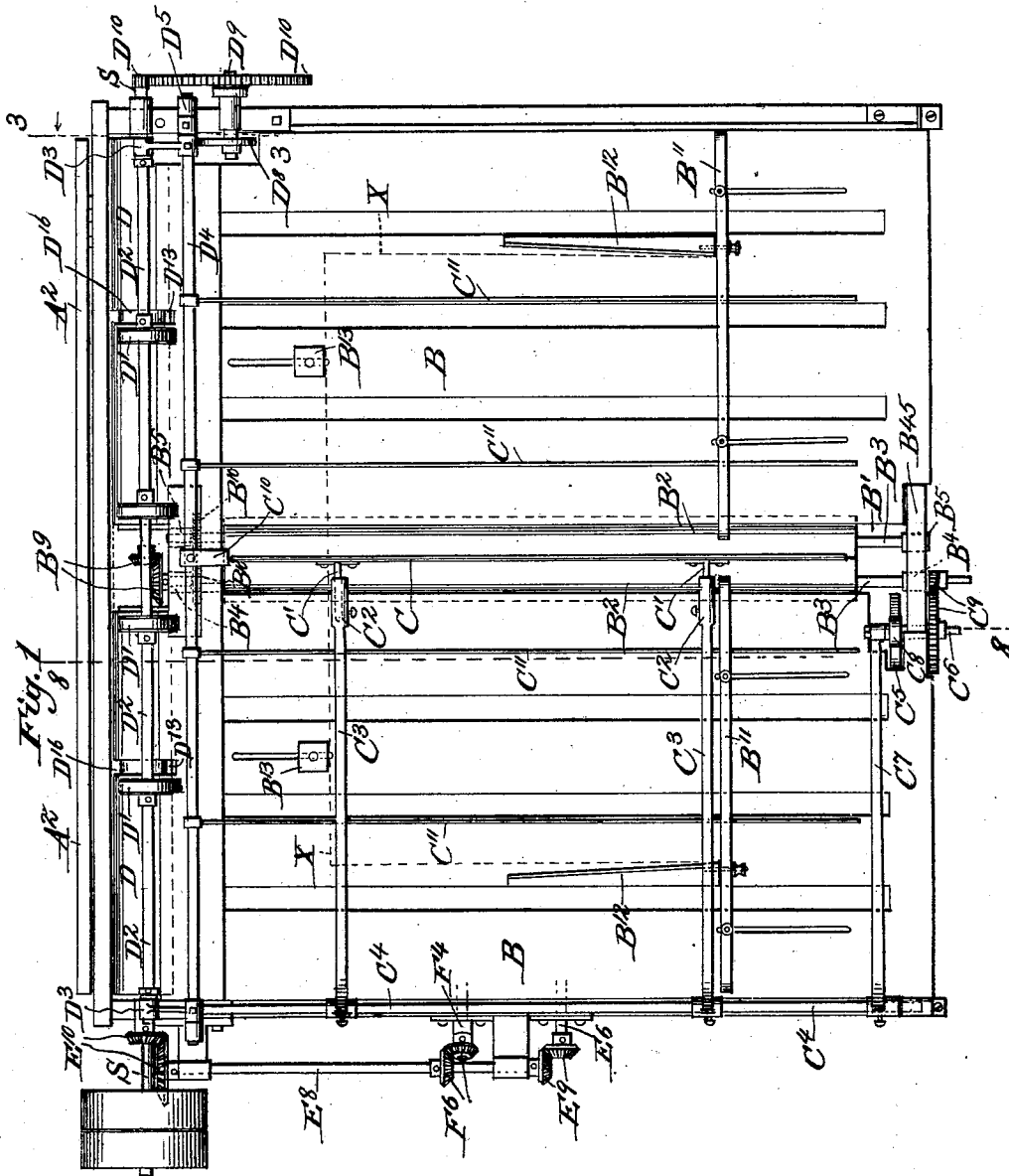
Patented Dec. 31, 1901.

D. I. ECKERSON.
PAPER FOLDING MACHINE.

(Application filed Mar. 19, 1901.)

(No Model.)

7 Sheets—Sheet 1.



Witnesses

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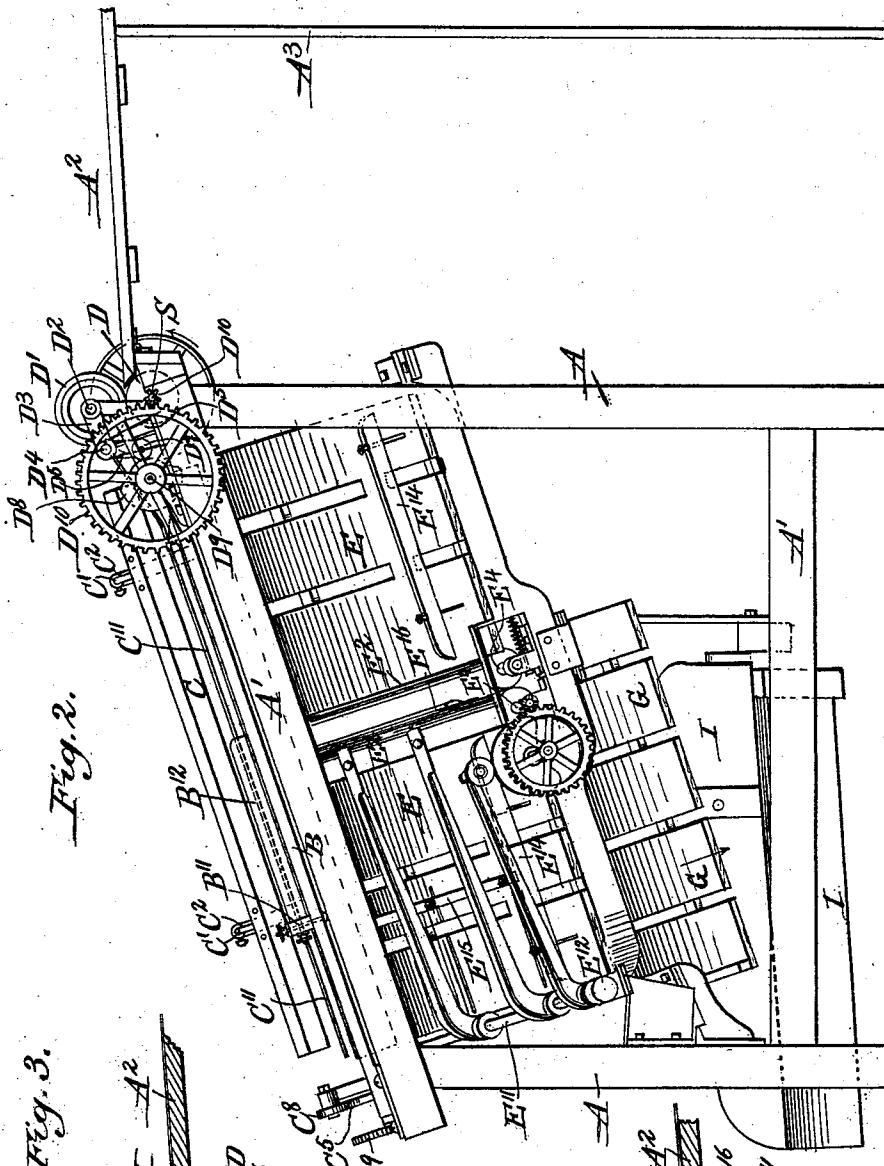
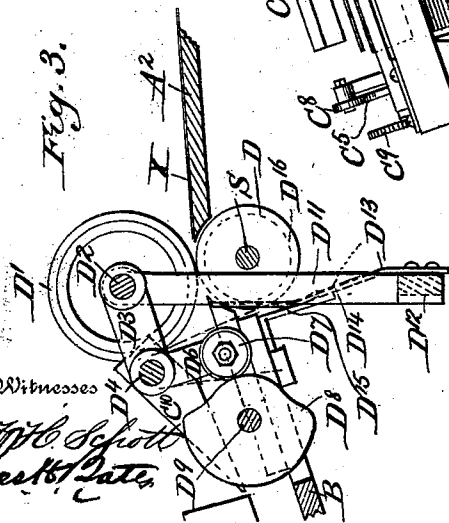


Fig. 2.

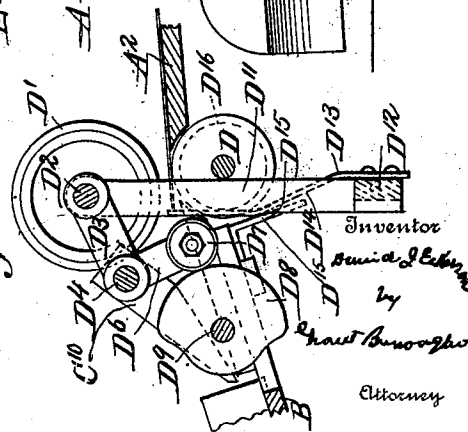
Fig. 3.



Witnesses

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Fig. 4.



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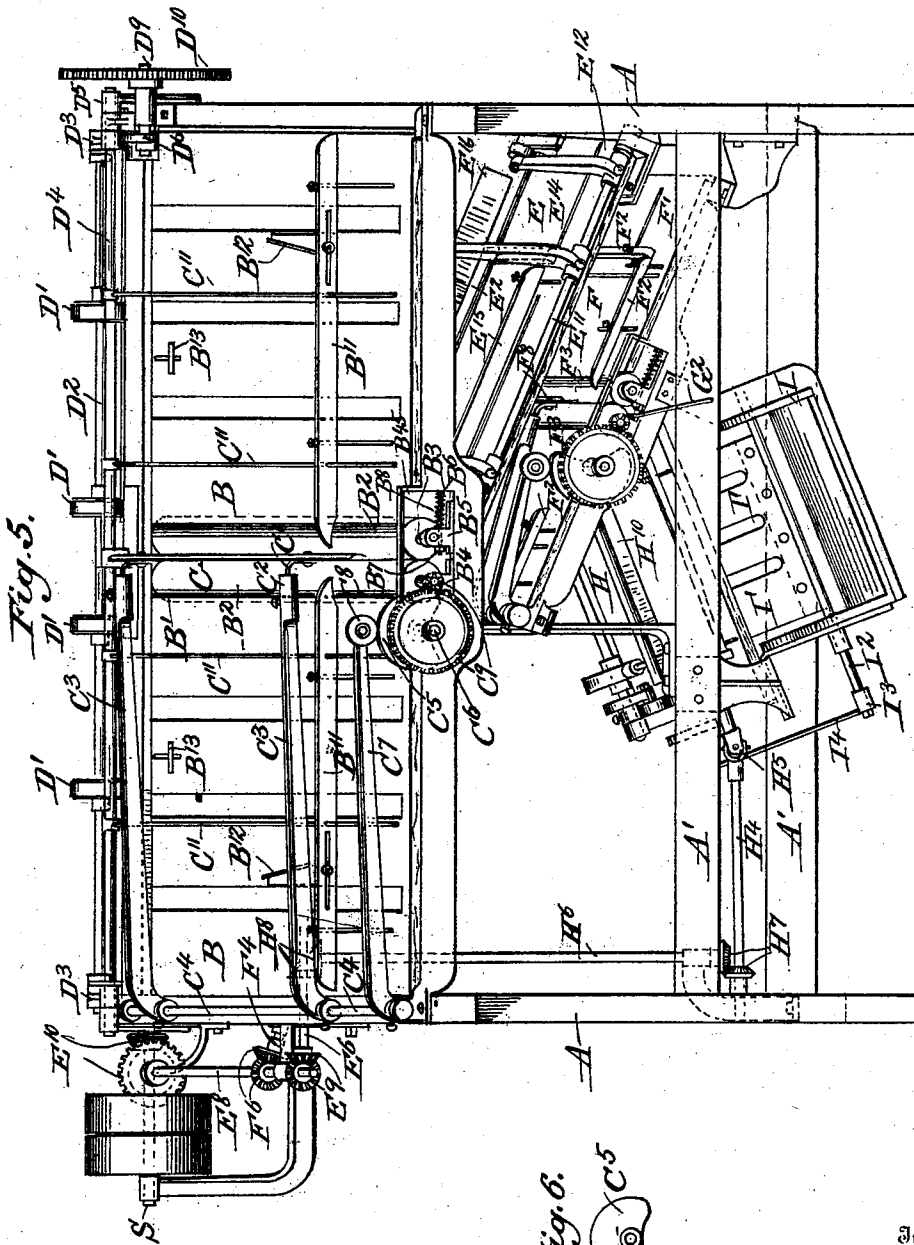
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7 Sheets—Sheet 3.



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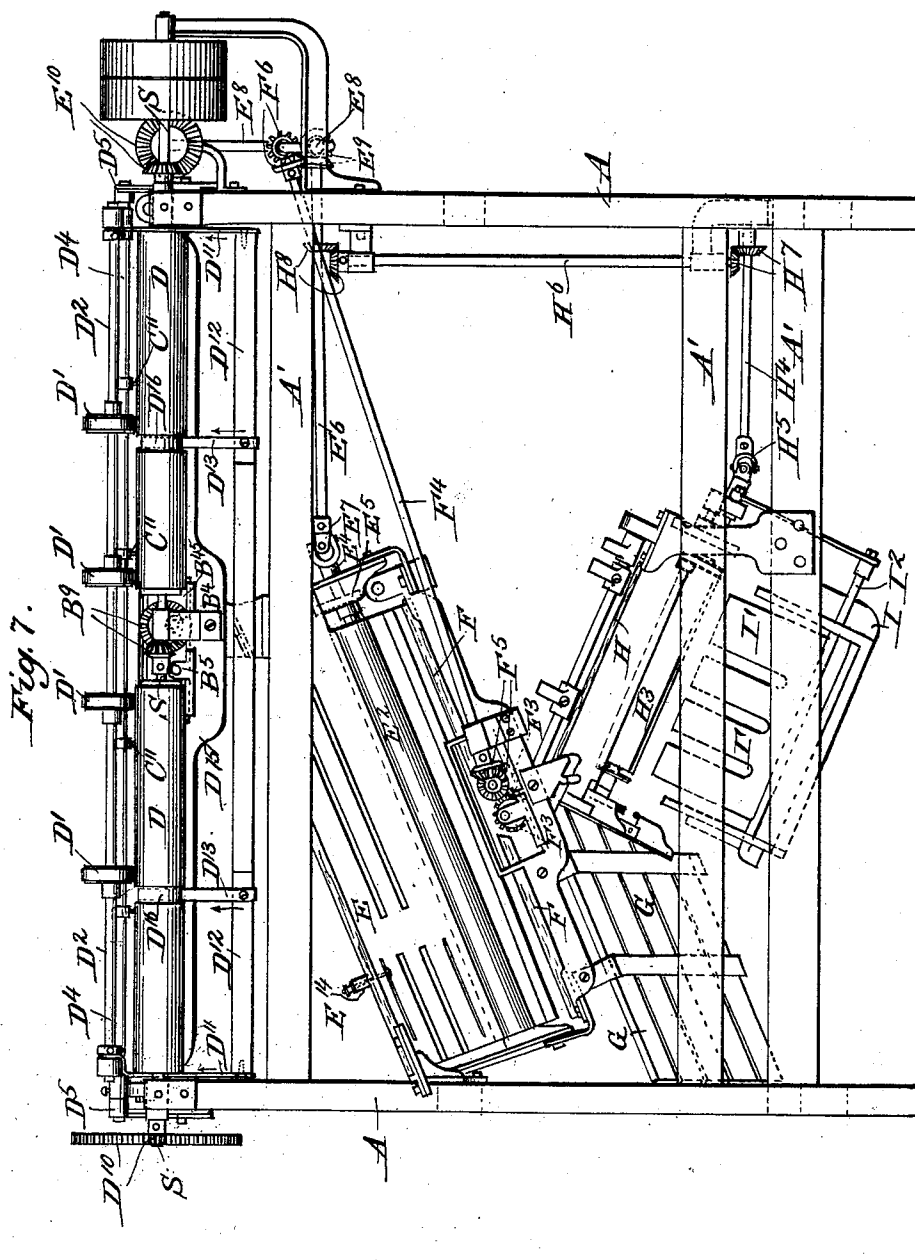
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7 Sheets—Sheet 4.



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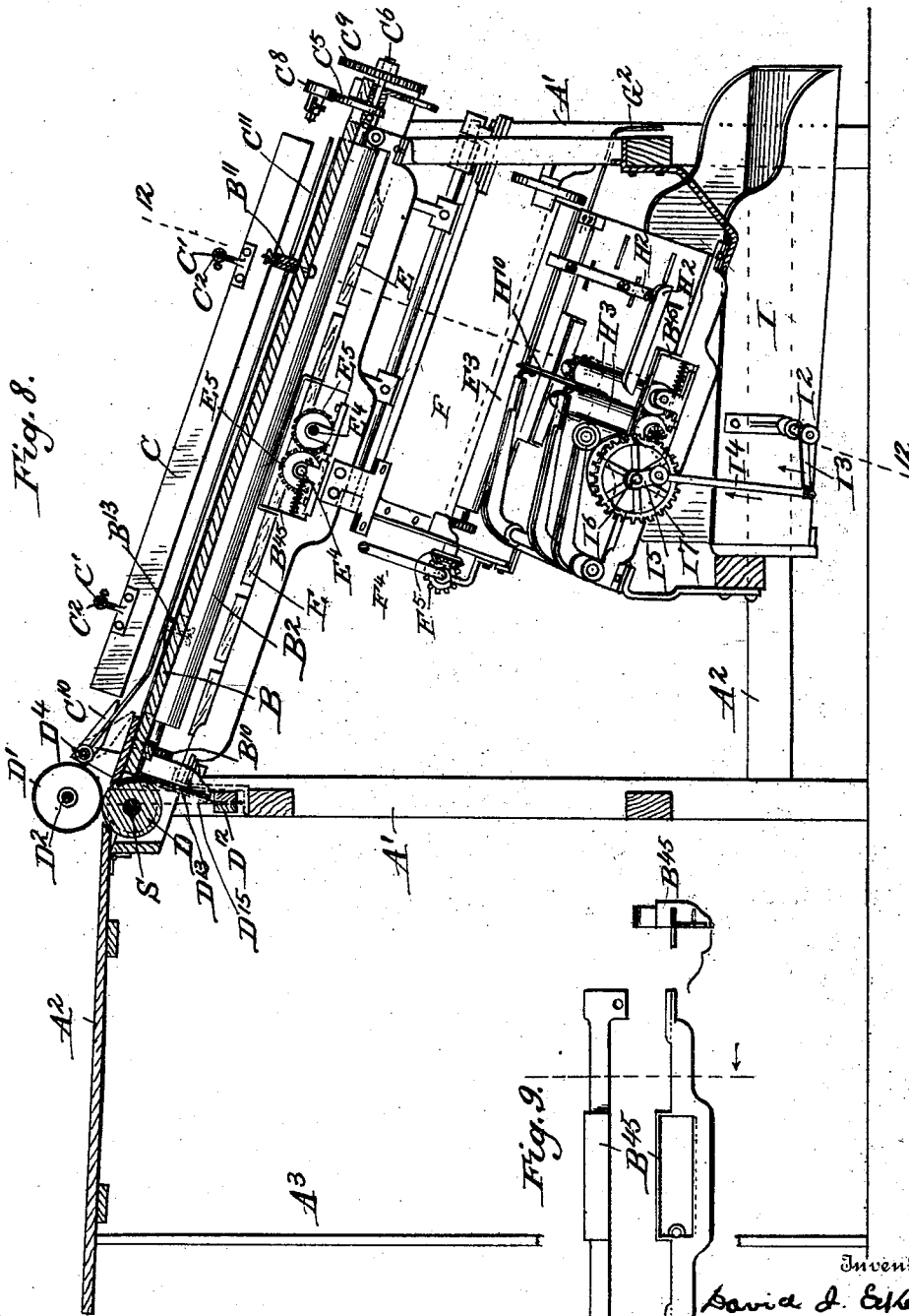
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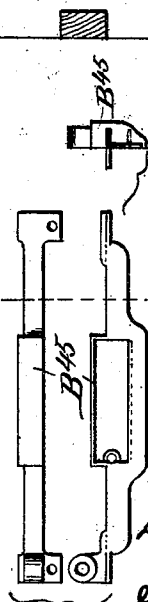
7 Sheets—Sheet 5.



Witnesses

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Fig. 9.



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7 Sheets—Sheet 6.

Fig. 10.

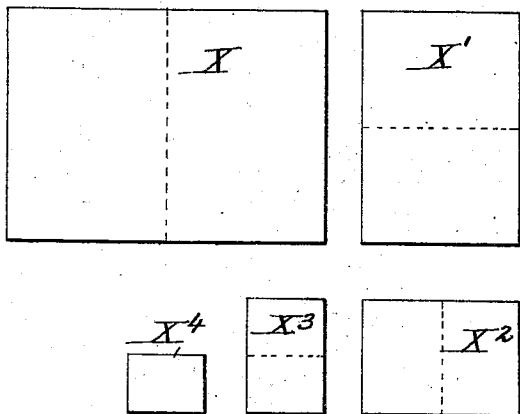


Fig. 11.

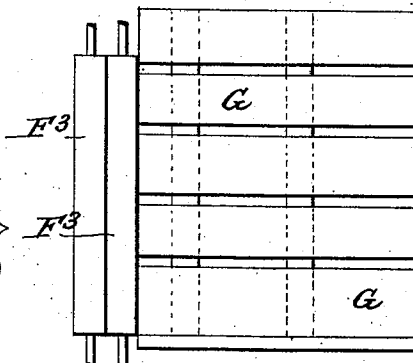


Fig. 12.

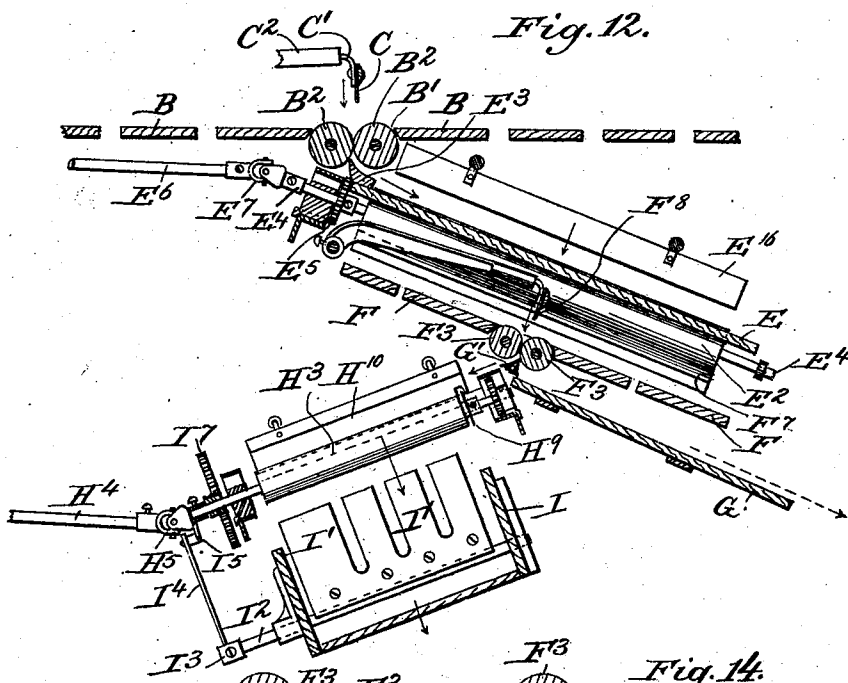


Fig. 13.

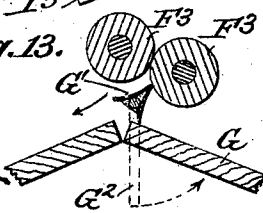
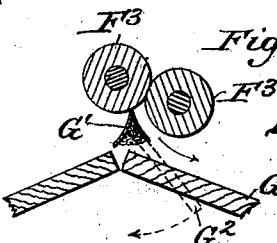


Fig. 14.



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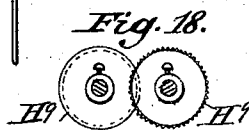
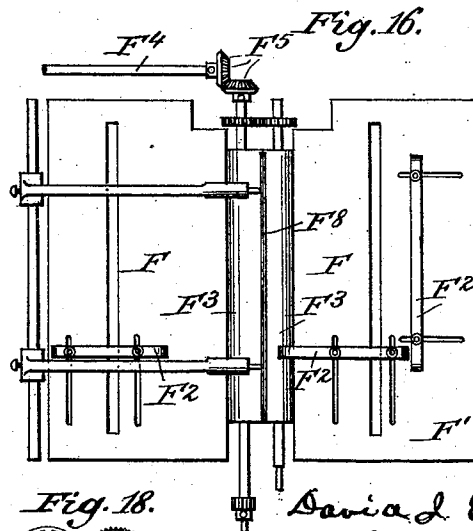
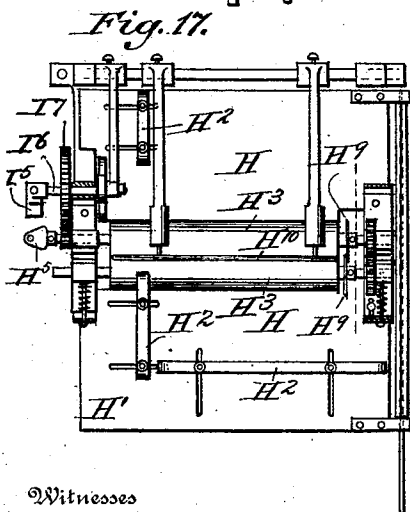
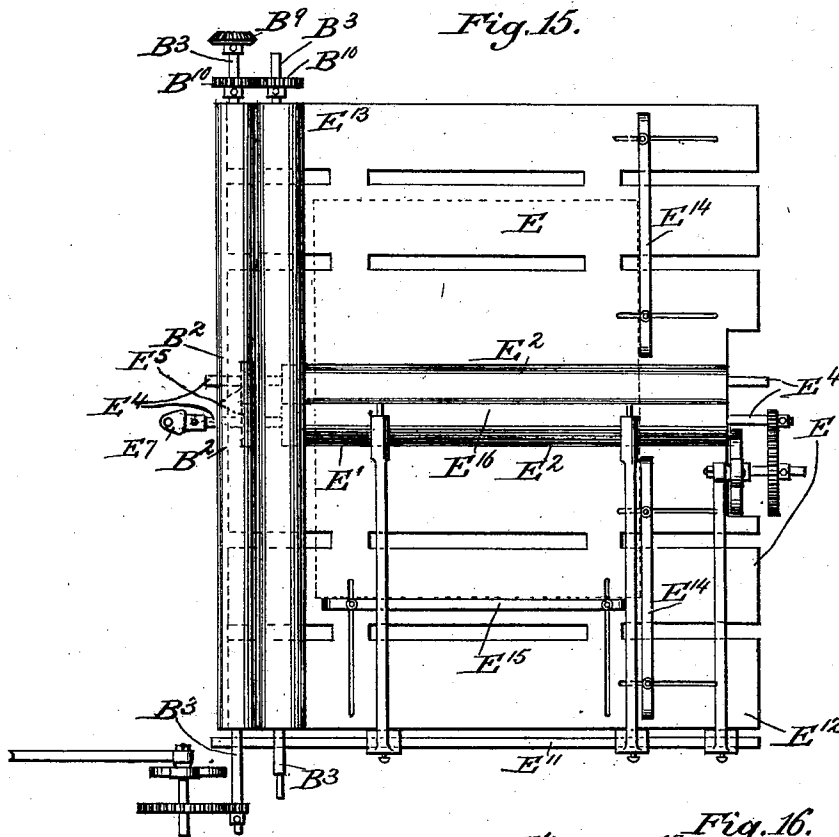
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7 Sheets—Sheet 7.



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PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 689,862, dated December 31, 1901.

Application filed March 19, 1901. Serial No. 51,901. (No model)

To all whom it may concern:

Be it known that I, DAVID I. ECKERSON, a citizen of the United States, and a resident of Worcester, in the county of Otsego and State of New York, have invented certain new and useful Improvements in Machines for Folding Paper, of which the following is a full, clear, and exact description, such as will enable those skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in paper-folding machines of that class in which the sheets are folded by being successively passed between gripping-rolls, into the bite of which they are forced by vibratory blades. It relates more particularly to such machines in which the use of tapes is dispensed with. In machines of this character as ordinarily constructed a comparatively high rate of speed cannot be obtained principally owing to the construction and relative arrangement of the folding mechanisms, which are such that the sheet in passing from one folding mechanism to the succeeding one often leaves its proper path of travel through the machine. In the invention in the present instance it is proposed to avoid this objectionable feature to a considerable extent by so constructing the folding mechanisms and so placing them relatively to each other as to cause the sheet to keep in its proper path of travel.

The invention consists in the novel construction, combination, and arrangement of parts, such as will be hereinafter fully described, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the accompanying drawings, in which similar reference characters designate corresponding parts, Figure 1 is a plan view of a folding-machine embodying the invention. Fig. 2 is a side elevation. Fig. 3 is an enlarged detail sectional view on the line 3 3 of Fig. 1, showing the feed-rolls in contact. Fig. 4 is a similar view showing the feed-rolls separated. Fig. 5 is an elevation showing the delivery end of the machine. Fig. 6 is a

detail view showing the cam for vibrating the folding-blade. Fig. 7 is an elevation showing the feeding-in end of the machine. In this view the feed-table is not shown for the sake of clearness. Fig. 8 is a longitudinal sectional view on the line 8 8 of Fig. 1. Fig. 9 is a detail view showing the housing for the bearings of the shafts of the gripping-rolls. Fig. 10 shows plan views of a sheet of paper as it appears during the several steps in the folding process. Fig. 11 shows the shunt-table in conjunction with the gripping-rolls for making the third fold. Fig. 12 is a sectional view on the line 12 12 of Fig. 8. Fig. 13 is a detail sectional view showing the controller interposed between the gripping-rolls and the table of the fourth folding mechanism and the shunt-table, the controller being in position to divert the paper to the table of the folding mechanism. Fig. 14 is a similar view showing the controller in a position to divert the paper to the shunt-table. Fig. 15 is a plan view of the table and its adjuncts of the second folding mechanism. Figs. 16 and 17, respectively, are similar views of the third and fourth folding mechanisms. Fig. 18 is a detail view showing the cutters for severing the leaves after the paper has been folded.

In several of the views some parts of the mechanism are not shown for the sake of clearness. Such omissions are obvious and need not be particularly referred to. Also as several features of the machine are common to the four different folding mechanisms they will be specifically described only in one instance and briefly alluded to in the others.

The frame supporting the several operative parts of the machine and their adjuncts may be of any description suitable in the premises. In the present instance it consists of the uprights A and the cross-pieces A', suitably joined together. To the feeding-in end of the machine is hinged the table A², and when it is raised its free end is supported by the movable standard A³. On this table the sheets of paper are placed preparatory to being fed into the machine.

The inclined table B of the first folding

mechanism is secured in the upper part of the frame with its highest edge adjacent to the feed-table A². It is divided by the opening or slot B', extending through its length.

5 Through this opening slightly project the gripping-rolls B², carried by the shafts B³. One of the latter is journaled at its ends in the fixed bearings B⁴, and the other is journaled at its ends in the movable bearings B⁵.

10 Both the fixed and movable bearings are mounted in the housing B⁴⁵. The adjustment of the movable bearings relatively to the fixed ones is regulated by the rods B⁶, passing through the same and connected with

15 the housings, and the nuts B⁷, turned onto the ends of the rods outside of the bearings. Interposed between the movable bearings and the housings and surrounding the rods are the coiled springs B⁸, normally pressing

20 the movable bearings toward the fixed ones. The shaft journaled in the fixed bearings is driven by the bevel-gears B⁹, connecting it with the main driving-shaft S, and motion is conveyed to the shaft journaled in the movable

25 bearings by the gears B¹⁰, connecting the two shafts. The latter gears have elongated teeth to permit the separation of the rolls to the required extent.

Coöperating with the gripping-rolls is the

30 folding-blade C, secured to the rods C', fitting in the sockets C² of the arms C³. Set-screws are provided for securing the rods in the sockets. By means of this connection with the arms the blade can be adjusted relatively to the rolls. The arms C³ are mounted

35 on the rock-shaft C⁴ and are oscillated by the cam C⁵ on the auxiliary shaft C⁶, engaging with the lever C⁷, secured on the shaft C⁴. (See Figs. 5 and 6.) A friction-roll C⁸ is interposed between the cam and the lever.

40 The auxiliary shaft C⁶ is rotated by the gears C⁹, connecting the same with the shaft B³, journaled in the fixed bearings. The gripping-rolls are relatively adjustable to accommodate them to the thickness of the paper that is to be passed between them. In order to secure a proper registration of the folding-blade with the rolls, the former is adjusted

45 on its arms so that when it descends it will enter between the rolls at the proper place.

50 In front of the inclined table B and interposed between it and the hinged table A² are the rolls D and D', respectively. The rolls D are mounted on the main driving-shaft S, and

55 the rolls D' are carried by the shaft D² above the rolls D. The shaft D² is journaled in the free ends of the arms D³, carried by the rock-shaft D⁴, journaled in the brackets D⁵, attached to the frame. An arm D⁶, secured to

60 the rock-shaft, forming with one of the arms D³ a bell-crank, carries a friction-roll D⁷, with which engages the cam D⁸, keyed on the shaft D⁹. The latter is rotated by the gears D¹⁰, connecting it with the main driving-shaft S.

65 (See Figs. 3, 4, and 7.) By means of the cam and the intervening mechanism the rolls D'

are intermittently raised and lowered while the machine is in operation.

Carried by the shaft D² are the hangers D¹¹, and to the lower ends of the latter is secured 70 the bar D¹², carrying the stops D¹³. As the rock-shaft D² is moved up and down the stops are also moved. When raised, these stops project a short distance above the table B and gage the placement of the paper preparatory 75 to its seizure by the feed-rolls. The stops have inclined sections D¹⁴, bearing against the angle-plate D¹⁵, so that when they are depressed they will be pressed into the annular recess D¹⁶ in the rolls D, and when the stops 80 are raised they will be moved away from the recesses. The position of the stops is such when they are raised the edge of the sheet of paper placed against them will extend over the lower rolls, so as to be engaged by the up- 85 per rolls when the latter descend. The relative movements of the rolls and stops are such that when the rolls are separated the stops will project above the surface of the table B, and when the rolls come together the stops 90 drop below the surface of the table.

Means are provided for guiding and holding the paper on the table B preparatory to its being folded. On the lower end of the 95 table the stops B¹¹ are adjustably secured to limit the downward movement of the paper. The movement sidewise is limited by the gages B¹², adjustably secured to the stops B¹¹. The inner faces of the gages B¹² are beveled, so as to guide the paper to its proper 100 position as it moves down the table. To prevent the sheet from rebounding after striking the stops B¹¹, blocks B¹³ are adjustably secured to the table near its upper end. These blocks have their upper faces beveled, so as to offer 105 no obstruction to the paper during its downward movement. As all of these several stops, gages, and blocks are adjustable, the table can be adapted to receive sheets of various sizes.

In passing onto the table if no provision 110 were made to prevent it the edge of the sheet might strike against the upper end of the folding-blade. To avoid this, a guard-block C¹⁰ is adjustably secured on the rock-shaft D⁴. This block is in line and in front of the blade 115 and is interposed between the latter and the feed-rolls D and D'. The movement of the rock-shaft is such that the guard-block moves with the folding-blade. The under side of the block is beveled, so that the edge of the 120 paper on leaving the feed-rolls will pass under the same, and thereby be forced down, so as not to come in contact with the end of the folding-blade. As the guard-block is adjustable on the rock-shaft, it can be moved when 125 the folding-blade is moved, so as to be in line with the latter. As the feed-rolls D' and the guard C¹⁰ are actuated by the same shaft D⁴, both will be moved simultaneously. When the rolls are raised to permit the introduction 130 of a sheet of paper, the guard is depressed to catch the sheet should it accidentally pass

the stops D¹³. Fingers C¹¹ are loosely mounted on the rock-shaft D⁴ and also serve to guide the paper and to hold it down upon the table.

Beneath the table B is located the mechanism for making the second fold. (See Figs. 2 and 15.) The table E is secured in the frame with an edge directly beneath and parallel with the gripping-rolls B² of the first folding mechanism. The table is inclined downwardly from this edge, and extending longitudinally through it is the opening E'. Through the latter project the gripping-rolls E² at right angles to the first pair B². Interposed between the gripping-rolls B² and the table E is the guide E³ for turning the paper in the right direction as it leaves the said rolls and passes onto the said table. (See Fig. 12.) The rolls E² are mounted and operated substantially in the same way as the rolls B² of the first folding mechanism. They are mounted on the shafts E⁴, respectively journaled in fixed and movable bearings. The shaft in the fixed bearing drives the other by the gears E⁵ and is driven by the shaft E⁶, with which it is connected by the universal joint E⁷, and the shaft E⁶ is driven by the shaft E⁸, with which it is connected by the bevel-gears E⁹. The shaft E⁸ is driven by the main shaft S through the bevel-gears E¹⁰. (See Fig. 7.) The rock-shaft E¹¹, carrying the second folding-blade E¹⁶, is rocked through intervening mechanism, as it is in the first instance, leading from the shaft E⁴ of the second pair of gripping-rolls, journaled in the fixed bearings. The inclination of the table E is such that its lowest point is the corner, as at E¹², diagonally opposite the corner, as E¹³, adjacent to the upper end of the gripping-rolls of the first folding mechanism. Consequently when the folded paper passes onto the second table it will drop toward the said lowest corner. To receive the paper and to hold it in place, the adjustable stops E¹⁴ and E¹⁵ are provided. These stops are so adjusted that the paper, which has been folded once, will be in position to be folded a second time. After the paper is in place the second folding blade E¹⁶ descends and creases the paper and forces it between the second set of gripping-rolls, which fold it a second time.

Located beneath the table E of the mechanism for making the second fold is the mechanism for making the third fold. (See Fig. 16.) This latter mechanism is substantially the same as the former ones, except that the table is smaller. The table F of the third folding mechanism is secured in the frame with an edge directly beneath and parallel with the gripping-rolls E². Its lowest point is the corner F', and it is provided with the stops F², which are the same as those on table E. Its gripping-rolls F³ are at right angles to the rolls E² of the second folding mechanism and are parallel with the rolls of the first folding mechanism. They are mounted and operated the same as the other rolls, and the shaft journaled in the fixed bearings is driven by the

shaft F⁴ through the bevel-gears F⁵, and the shaft F⁴ in turn is rotated by the bevel-gears F⁶, connecting it with the shaft E⁸. (See Fig. 7.) Interposed between the rolls E² and the table F is a guide F⁷, similar to the guide E³ of the second folding mechanism. (See Fig. 12.) The folding-blade F⁸ is operated in the same way as in the previous instances.

Under the table F are located a shunt-table G and the mechanism for making the fourth fold. (See Figs. 13, 14, and 17.) Directly beneath the gripping-rolls F³ of the third folding mechanism is the controller or switch G' for diverting the paper to either the shunt-table or to the mechanism for making a fourth fold. When three folds are sufficient, the controller can be turned to cause the paper to leave the machine over the shunt-table. A handle G² is provided for turning the controller.

The construction of the mechanism for making the fourth fold is the same as that of the preceding ones. An edge of its table H is located adjacent to and parallel with the gripping-rolls F³. Its lowest point, and toward which the paper falls, is the corner H'. This corner is provided with the usual stops or gages H². The shaft of its gripping-rolls H³, that is journaled in the fixed bearings, is driven by the shaft H⁴, with which it is connected by the universal joint H⁵. The shaft H⁴ is driven in turn by the shaft H⁶ through the bevel-gears H⁷, and the latter shaft is driven by the shaft E⁶ through the gears H⁸. (See Fig. 12.)

When the paper reaches the fourth folding mechanism, several of its leaves are connected at their edges. To sever these leaves, rotary knives H⁹ are mounted on the shafts of the rolls H³, so that when the paper passes between the said rolls the knives will cut the leaves, so that they can be separated. (See Figs. 17 and 18.) The folding-blade H¹⁰ in this instance is operated in the same way as in the preceding ones.

Beneath the mechanism for making the fourth fold is the delivery mechanism. (See Figs. 8 and 12.) Under the rolls H³ is the receiving-box I, and in the same is the flier I', mounted on the shaft I². On an end of the shaft I² is the arm I³, connected by the pitman I⁴ with the crank I⁵ on the shaft I⁶ of the gear I⁷ for driving the cam that operates the folding-blade H¹⁰. When the folded paper drops from the rolls H³ in front of the flier, it is thrown forward toward the mouth of the box.

The operation of the machine is as follows: It is assumed that the several parts of the machine have been adjusted to accommodate the sheets to be folded and that the machine is in motion and that the feed-rolls D and D' are separated. A sheet, as X, is placed upon the table A² with an edge against the stops D¹³. The sheets so placed will be in the proper position to be fed into the machine. As the feed-rolls come together the stops drop below

the table and the paper is gripped by the rolls and is fed into the machine onto the table B of the mechanism for making the first fold. As the sheet travels down the inclined table it takes the position indicated by dotted lines in Fig. 1. When it reaches this position, the blade C descends and creases it along a medial line and forces it between the gripping-rolls B², which seize it and fold it into two leaves of the comparative size of X', as shown in Fig. 10. As the folded paper leaves the rolls B² it is turned by the guide E³ onto the table E in position to be folded a second time with four leaves of the comparative size of X². This is repeated by the third and fourth folding mechanisms until the sheet has been successively folded into eight leaves of the comparative size of X³ and finally into sixteen leaves of the comparative size of X⁴. It finally passes into the box I, from which it can be taken by an attendant. It is to be noted that the several folding mechanisms are so close together and that the receiving-table of a succeeding mechanism is so close to the gripping-rolls of a preceding mechanism that there is but little chance of the paper escaping from its proper path of travel.

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

1. In a folding-machine, gripping-rolls, a folding-blade cooperating with said rolls, means for feeding a sheet of paper between said blade and said rolls, and a movable guard interposed between said feed mechanism and said blade to prevent the edge of the paper from striking the end of said blade.

2. In a folding-machine, relatively adjustable gripping-rolls, an adjustable folding-blade cooperating with said rolls, means for vibrating said blade, mechanism for feeding sheets of paper between said blade and said rolls, and an adjustable guard movable with said blade to prevent the edge of the paper from striking against said blade.

3. In a folding-machine, an inclined table divided longitudinally by an opening, gripping-rolls registering with said opening, a folding-blade cooperating with said gripping-rolls, mechanism for feeding sheets of paper between said blade and said rolls, and a guard interposed between said feeding mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

4. In a folding-machine, relatively adjustable gripping-rolls, an adjustable folding-blade cooperating with said rolls, mechanism for feeding sheets of paper between said blade and said rolls, and an adjustable guard interposed between said feeding mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

5. In a folding-machine, an inclined table divided longitudinally by an opening, gripping-rolls registering with said opening, a folding-blade cooperating with said rolls, stops mounted on the lower end of said table

and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, mechanism for feeding sheets of paper onto said table beneath said blade, and a guard interposed between said feeding mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

6. In a folding-machine, an inclined table divided longitudinally by an opening, relatively adjustable gripping-rolls registering with said opening, an adjustable folding-blade cooperating with said rolls, stops mounted on the lower end of said table and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, mechanism for feeding sheets of paper onto said table beneath said blade, and an adjustable guard interposed between said feeding mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

7. In a folding-machine, an inclined table divided longitudinally by an opening, gripping-rolls registering with said opening, a folding-blade cooperating with said rolls, means for vibrating said blade, stops mounted on the lower end of said table and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, mechanism for feeding sheets of paper onto said table beneath said blade, and a movable guard movable with said blade interposed between said feed mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

8. In a folding-machine, an inclined table divided longitudinally by an opening, relatively adjustable gripping-rolls registering with said opening, an adjustable folding-blade cooperating with said rolls, means for vibrating said blade, stops mounted on the lower end of said table and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, mechanism for feeding sheets of paper onto said table beneath said blade, and an adjustable guard movable with said blade to prevent the edge of the paper from striking the end of the blade.

9. In a folding-machine, an inclined table divided longitudinally by an opening, gripping-rolls registering with said opening, a folding-blade cooperating with said rolls, stops mounted on the lower end of said table and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, and means for feeding sheets of paper onto said table beneath said blade.

10. In a folding-machine, an inclined table divided longitudinally by an opening, gripping-rolls registering with said opening, a

folding-blade cooperating with said rolls, stops mounted on the lower end of said table and adjustable longitudinally of the same, gages having beveled inner faces movably secured to said stops and adjustable transversely of said table, blocks with their upper faces beveled movably secured to said table near its upper end and adjustable longitudinally of the same, and means for feeding sheets of paper onto said table beneath said blade.

11. In a folding-machine, relatively adjustable gripping-rolls mounted on shafts respectively journaled in fixed and movable bearings, means for rotating the shaft journaled in the fixed bearings, gears connecting the shafts of the gripping-rolls, a rock-shaft, arms carried by said rock-shaft, a folding-blade adjustably carried by said arms and cooperating with said rolls, a lever secured to said rock-shaft, an auxiliary shaft journaled adjacent to the shaft of the gripping-roll journaled in the fixed bearings, a cam mounted on said auxiliary shaft and engaging with the free end of said lever to oscillate the same, and gears for conveying motion from the shaft of the gripping-roll journaled in the fixed bearings to the auxiliary shaft carrying the cam.

12. In a folding-machine, gripping-rolls carried by rotatable shafts, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade carried by said arms and cooperating with said rolls, a lever secured on said rock-shaft, an auxiliary shaft journaled adjacent to the shaft of one of the gripping-rolls, a cam mounted on said auxiliary shaft and engaging with the free end of said lever to oscillate the same, and gears connecting the cam-carrying shaft with the shaft of the gripping-roll adjacent to it.

13. In a folding-machine, gripping-rolls carried by rotatable shafts, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade carried by said arms and cooperating with said rolls, a lever secured to said rock-shaft, a cam rotated by the shaft of one of the gripping-rolls and engaging with the free end of said lever to oscillate the same, mechanism for feeding a sheet of paper between said blade and said rolls, and a guard interposed between said feed mechanism and said blade to prevent the edge of the paper from striking the end of the blade.

14. In a folding-machine, gripping-rolls carried by rotatable shafts, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade carried by said arms and cooperating with said rolls, means for vibrating said blade, a lever secured to said rock-shaft, a cam rotated by the shaft of one of the gripping-rolls and engaging with the free end of said lever to oscillate the same, mechanism for feeding a sheet of paper between said blade and said rolls, and

a movable guard interposed between said feed mechanism and said blade and movable with the latter to prevent the edge of the paper from striking the end of the blade.

15. In a folding-machine, relatively adjustable gripping-rolls mounted on shafts respectively journaled in fixed and movable bearings, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade adjustably carried by said arms and cooperating with said rolls, a lever secured to said rock-shaft, a cam rotated by the shaft of the gripping-roll journaled in the fixed bearings and engaging with the free end of said lever to oscillate the same, mechanism for feeding a sheet of paper between said blade and said rolls, and an adjustable guard interposed between said feed mechanism and said blade to prevent the edge of paper from striking the end of the blade.

16. In a folding-machine, relatively adjustable gripping-rolls mounted on shafts respectively journaled in fixed and movable bearings, means for rotating the shaft of the roll journaled in the fixed bearings, gears connecting the shafts of the gripping-rolls, a rock-shaft, arms carried by said rock-shaft, a folding-blade adjustably carried by said arms and cooperating with said rolls, means for vibrating said blade, a lever secured to said rock-shaft, an auxiliary shaft journaled adjacent to the shaft of the roll journaled in the fixed bearings, a cam mounted on said auxiliary shaft and engaging with the free end of said lever to oscillate the same, gears for conveying motion from the shaft of the roll journaled in the fixed bearings to the shaft carrying the cam, mechanism for feeding a sheet of paper between said rolls and said blade, and an adjustable guard movable with said blade to prevent the edge of the paper from striking the end of the blade.

17. In a folding-machine, gripping-rolls, a folding-blade cooperating with said rolls, fixed and movable feed-rolls for feeding paper between said gripping-rolls and said folding-blade, and a guard movable with the movable feed-roll to prevent the edge of the paper from striking the end of said blade.

18. In a folding-machine, gripping-rolls, a folding-blade cooperating with said rolls, relatively movable feed-rolls for feeding paper between said gripping-rolls and said folding-blade, a movable stop cooperating with said feed-rolls to limit the introduction of the paper between said feed-rolls, means for moving said feed-rolls together and simultaneously moving said stop out of the path of the paper, and a movable guard interposed between said feed-rolls and said folding-blade to prevent the paper from striking the end of the blade.

19. In a folding-machine, gripping-rolls, a folding-blade cooperating with said rolls, fixed and movable feed-rolls for feeding paper between said gripping-rolls and said folding-blade, a movable stop cooperating with said

feed-rolls to limit the introduction of the paper between said feed-rolls, a movable guard interposed between said feed-rolls and said folding-blade to prevent the paper from striking the end of the blade, and means for simultaneously moving said movable feed-roll, said stop and said guard.

20. In a folding-machine, a fixed feed-roll, a rock-shaft, arms secured at one end to said rock-shaft, a shaft journaled in the free ends of said arms, movable feed-rolls mounted on said shaft journaled in the free ends of the arms and cooperating with said fixed feed-rolls, gripping-rolls, a folding-blade cooperating with said gripping-rolls, a guard secured on said rock-shaft and interposed between said feed-rolls and said folding-blade to prevent paper from striking the end of the blade, and means for partially rotating said rock-shaft.

21. In a folding-machine, a fixed feed-roll, a rock-shaft, arms secured at one end to said rock-shaft, a shaft journaled in the free ends of said arms, movable feed-rolls mounted on said shaft journaled in the free ends of the arms and cooperating with said fixed feed-roll, gripping-rolls, a folding-blade cooperating with said gripping-rolls, a guard secured on said rock-shaft and interposed between said feed-rolls and said folding-blade to prevent the paper from striking the end of the blade, means for partially rotating said rock-shaft, hangers attached to said shaft journaled in the free ends of the arms, and stops carried by said hangers for limiting the introduction of the paper between said feed-rolls.

22. In a folding-machine, a series of folding mechanisms each comprising a table divided longitudinally by an opening, gripping-rolls registering with said opening and carried by rotatable shafts, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade carried by said arms and cooperating with said gripping-rolls, a lever secured on said rock-shaft, and a cam rotated by the shaft of one of the gripping-rolls and engaging with the free end of said lever to oscillate the same, the said folding mechanisms being successively arranged with their tables relatively inclined and placed one below another with the upper edge of the table of a succeeding folding mechanism adjacent to and parallel with the gripping-rolls of a preceding folding mechanism.

23. In a folding-machine, a series of folding mechanisms each comprising a table divided longitudinally by an opening, relatively adjustable gripping-rolls registering with said opening and carried by rotatable shafts respectively journaled in fixed and movable bearings, means for driving said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade adjustably carried by said arms and cooperating with said rolls, a lever secured on said rock-shaft, and a cam rotated by the shaft of the gripping-roll journaled in

the fixed bearing and engaging with said lever to oscillate the same, the said folding mechanisms being successively arranged with their tables relatively inclined and placed one below another with the upper edge of the table of a succeeding folding mechanism adjacent to and parallel with the gripping-rolls of the preceding folding mechanism.

24. In a folding-machine, a series of folding mechanisms each comprising a table divided by a longitudinal opening, relatively adjustable gripping-rolls registering with said opening and carried by rotatable shafts respectively journaled in fixed and movable bearings, means for rotating the shaft of the roll journaled in the fixed bearings, gears connecting the shafts of the gripping-rolls, a rock-shaft, arms carried by said rock-shaft, a folding-blade adjustably carried by said arms and cooperating with said gripping-rolls, a lever secured to said rock-shaft, an auxiliary shaft journaled adjacent to the shaft of the roll journaled in the fixed bearings, a cam mounted on said auxiliary shaft and engaging with said lever to oscillate the same, and gears for conveying motion from the shaft of the roll journaled in the fixed bearings to the auxiliary shaft carrying the cam, the said folding mechanisms being successively arranged with the tables relatively inclined one below another with the upper edge of the table of a succeeding folding mechanism adjacent to and parallel with the gripping-rolls of the preceding folding mechanism.

25. In a folding-machine, a series of folding mechanisms each comprising a table divided longitudinally by an opening, gripping-rolls registering with said opening and carried by rotatable shafts, means for rotating said shafts, a rock-shaft, arms carried by said rock-shaft, a folding-blade carried by said arms and cooperating with said gripping-rolls, a lever secured on said rock-shaft, an auxiliary shaft journaled adjacent to one of the shafts of the gripping-rolls, a cam mounted on said auxiliary shaft and engaging with the free end of said lever to oscillate the same, and gears connecting said auxiliary shaft to the shaft of the gripping-roll adjacent to it, the said folding mechanisms being successively arranged with their tables relatively inclined and below one another with the upper edge of the table of a succeeding folding mechanism adjacent to and parallel with the gripping-rolls of the preceding folding mechanism, and a guide interposed between the gripping-rolls of a preceding folding mechanism and the table of a succeeding mechanism.

26. In a folding-machine, a pair of inclined gripping-rolls, a table with an edge adjacent to and parallel with said gripping-rolls and with the opposite edge depressed below said rolls so that said table is inclined in two directions from the horizontal, and stops on the lower part of said table to hold in place the paper fed onto said table by said rolls.

27. In a folding-machine, a pair of inclined

gripping-rolls, a table with an edge adjacent to and parallel with said gripping-rolls and with the opposite edge depressed below said rolls so that said table is inclined in two directions from the horizontal, and stops at right angles to each other adjustably mounted on the lower part of said table to receive the corner of the paper fed onto said table by said rolls and to hold the same in place.

28. In a folding-machine, a pair of inclined gripping-rolls, a table with an edge adjacent to and parallel with said gripping-rolls and with the opposite edge depressed below said rolls so that said table is inclined in two directions from the horizontal, relatively adjustable gripping-rolls registering with an opening in said table extending at right angles to the first-mentioned rolls, an adjustable folding-blade cooperating with said adjustable gripping-rolls, and stops on the lower part of said table to hold in place the paper fed by the first-mentioned rolls onto said table between said blade and said adjustable gripping-rolls.

29. In a folding-machine, a pair of inclined gripping-rolls, a table with an edge adjacent to and parallel with said gripping-rolls and with the opposite edge depressed below said rolls so that said table is inclined in two directions from the horizontal, relatively adjustable gripping-rolls registering with an opening in said table extending at right angles to the first-mentioned rolls, an adjustable folding-blade cooperating with said adjustable gripping-rolls and stops at right angles to each other adjustably mounted on the lower part of said table to receive the corner of the paper fed by the first-mentioned rolls onto said table between said blade and said gripping-rolls to hold the paper in place.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

DAVID I. ECKERSON.

Witnesses:

BIRNEY GOODENOUGH,
J. S. WATERMAN.