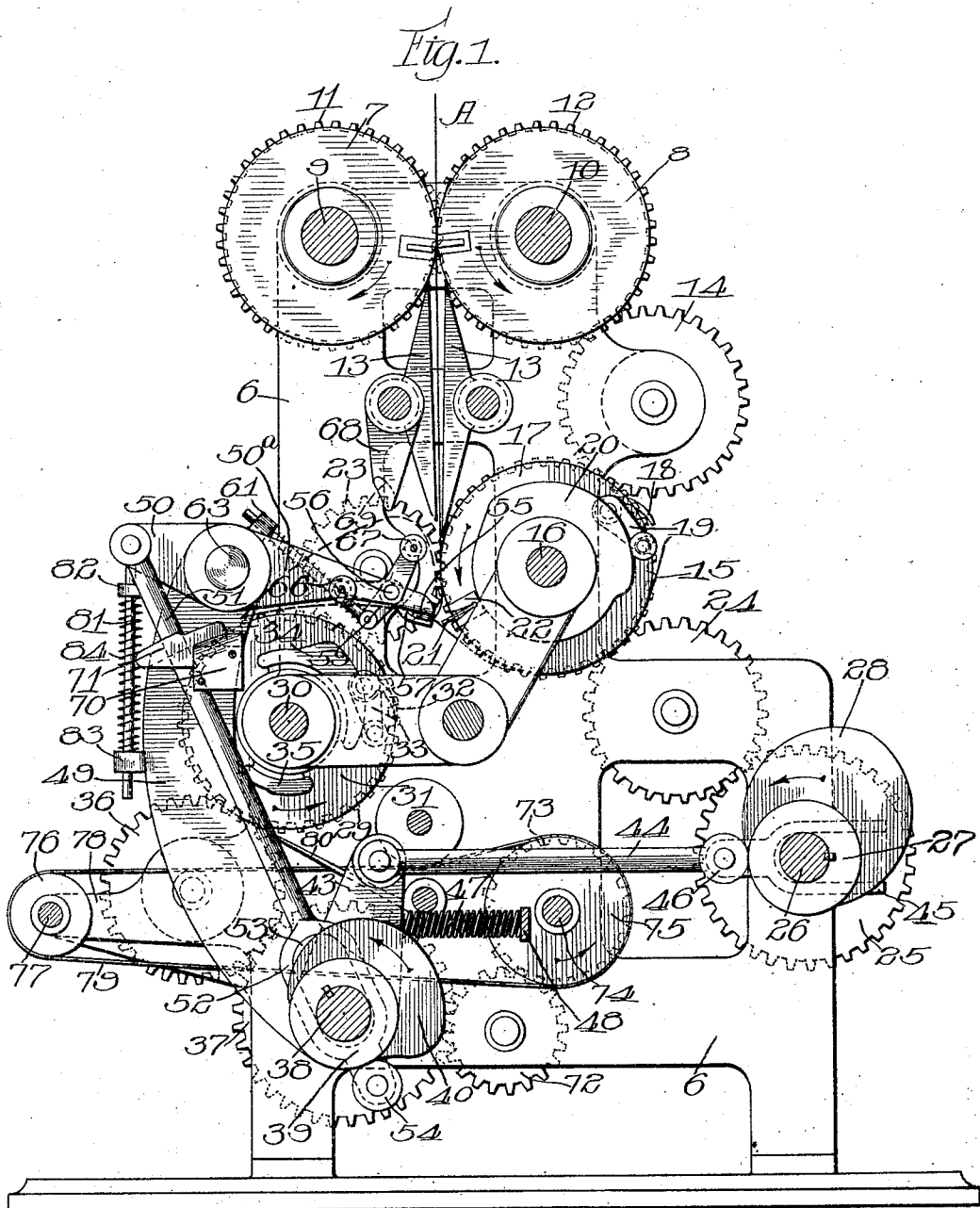


H. C. SCHROEDER.
FOLDING MECHANISM.
APPLICATION FILED JUNE 1, 1909.

954,141.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 1.



Witnesses:
Ed. D. Perry
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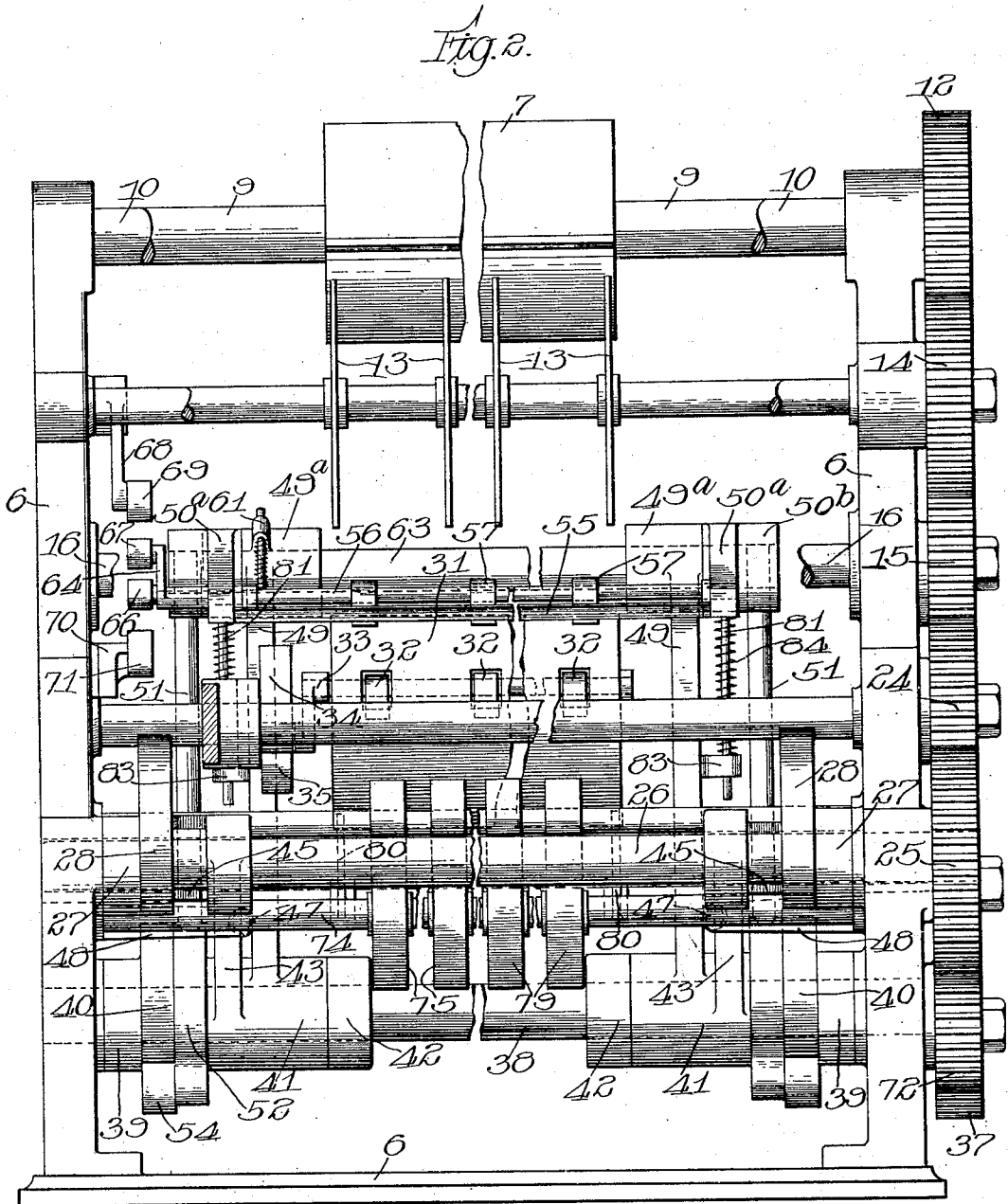
Inventor:
Hans C. Schroeder
Ben Adams, Percival Jackson
Attys

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3 SHEETS—SHEET 2.



Witnesses:
Ed. D. Perry
G. W. D. Marus Jr.

Inventor:
H. C. Schroeder
By *Adams, Picard & Jackson*
Attys

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3 SHEETS—SHEET 3.

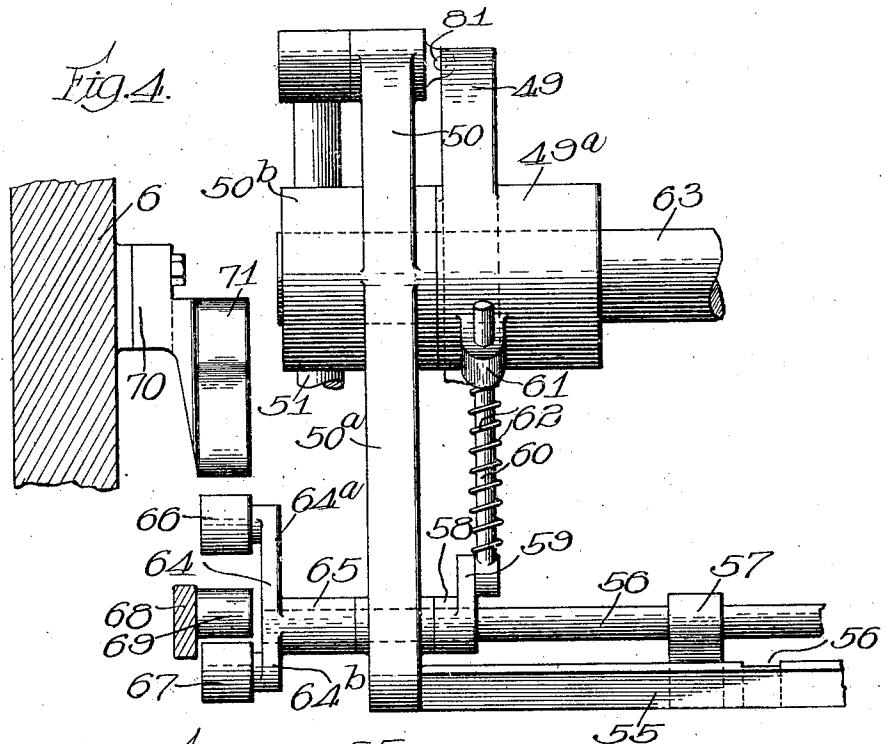
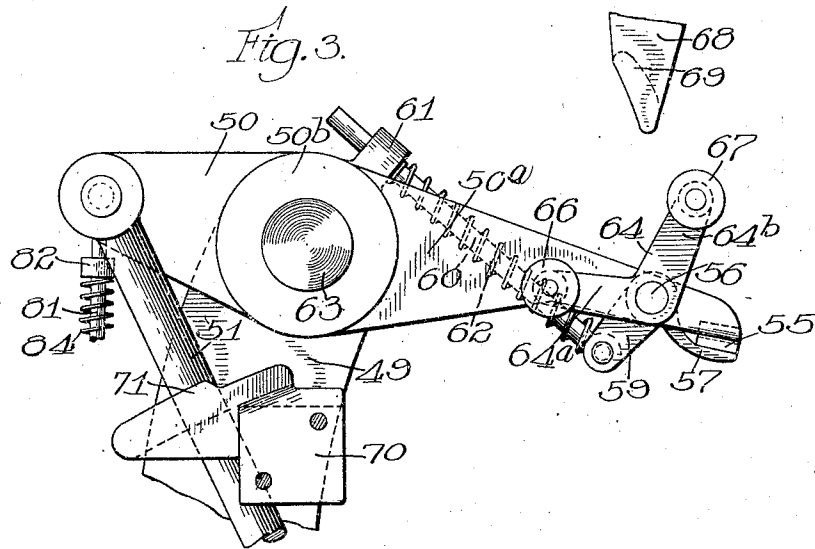
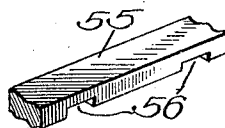


Fig. 5.

Witnesses:
Ed. D. Perry
G. D. Duvarus Jr.



Inventor
Hans C. Schroeder
By Adam P. K. J. J. J.
Att.

UNITED STATES PATENT OFFICE.

HANS C. SCHROEDER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

FOLDING MECHANISM.

954,141.

Specification of Letters Patent.

Patented Apr. 5, 1910.

Application filed June 1, 1909. Serial No. 499,478.

To all whom it may concern:

Be it known that I, HANS C. SCHROEDER, a subject of the German Emperor, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Folding Mechanism, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to sheet folding mechanism for giving a fold to the sheet transverse of the run of the sheet or web, and particularly to that type of folding mechanism in which such transverse fold is given by means of a moving carrier having a tucking or folding blade and a traveling carrier having gripping jaws which grip the sheet between them over the folding blade and as their movement continues pull the sheet from the first carrier, fold first, and deliver it to suitable delivery mechanism.

The object of my invention is to provide a new and improved mechanism in machines of this general type by which the gripping jaws may be enabled to grip the sheet while in a position radial to the carrier and the folding blade, and, carrying the sheet, fold first, from the carrier, may be in a position substantially tangential to the line of travel when they arrive at their point of delivery of the sheet.

My invention further relates to details of improvement in mechanism of this general character hereinafter set forth.

In the drawings: Figure 1 is a side elevation with the frame on the near side removed to show the working parts. Fig. 2 is an end elevation seen from the right of Fig. 1, with certain of the cylinders and parts removed and some of the shafts broken away in order to expose the principal working parts. Fig. 3 is an enlarged detail, being a side elevation of the top part of one of the swinging arms and the attachment by which the gripping jaws are worked. Fig. 4 is an enlarged detail, being a top or plan view of the part shown in Fig. 3. Fig. 5 is an enlarged detail, being an isometric view of a portion of the fixed gripping jaw to show the cut-away portions for the passage of the grippers on the delivery cylinder.

Referring to the drawings, 6 indicates the frame of the folder.

7—8 indicate cutting cylinders mounted,

respectively, on shafts 9—10, journaled in the framework.

11—12 indicate intermeshing gears secured respectively upon the outer ends of the shafts 9 and 10. These gears are driven in any approved way, either by connecting with the driving train of a printing press (not shown) or in any other well-known manner.

13 indicates guides suitably mounted in the framework 6 and disposed below the cutting cylinders 7—8 so as to guide the sheet between them downward to the folding mechanism hereinafter described. The cutting cylinders 7—8 are of any well-known type.

14 indicates an idler gear suitably mounted in the framework 6 and meshing with gear 12.

15 indicates a gear secured upon the outer end of shaft 16 journaled in the framework 6 and meshing with gear 14.

17 indicates a rotary carrier which is mounted upon the shaft 16 and is provided with suitable sheet-engaging devices as grippers 18, which are adapted to seize the lead end of the sheet as it passes downward between the guides 13 and carry it around with the cylinder to a suitable point at which the grippers are operated to release the edge of the sheet. The grippers 18 may be operated in any well-known manner, as by lever 19 and cam 20.

21 indicates a folding blade or tucker blade mounted in a block 22 and extending longitudinally of the carrier 17. The folding blade 21 may be of any well-known character and worked in any well-known manner. It is so arranged that it projects beyond the periphery of the carrier 17 to thrust the paper between the grip of the gripping jaws hereinafter described.

23 indicates an idler gear which is suitably journaled on the framework 6 and meshes with the gear 15.

24 indicates an idler gear suitably journaled on the framework 6 and meshing with the gear 15 and with a gear 25 secured to the outer end of shaft 26 journaled in the framework of the machine.

27 indicates collars fixed on the shaft 26.

28 indicates a cam preferably formed integral with each of the collars 27.

29 indicates a gear which is secured upon the outer end of shaft 30 journaled in the

framework of the machine and which meshes with the idler gear 23.

31 indicates a delivery cylinder which is secured upon the shaft 30 and which is provided with grippers 32. This delivery cylinder and the grippers 32 operate in the well-known manner,—namely, to seize the folded edge of the sheet of paper at the proper time when delivered to them as hereinafter described, and, carrying the sheet, folded edge first, around the delivery cylinder, discharge the sheet, the grippers being opened for the purpose. The grippers 32 may be operated in any well-known manner, as by levers 33 and cams 34—35.

36 indicates an idler gear which is journaled in the framework 6 and meshes with gear 29.

37 indicates a gear secured to the outer end of a shaft 38 journaled in the framework of the machine.

39 indicates collars which are keyed or otherwise secured to the shaft 38 and each of which has upon it, preferably formed integral therewith, a cam 40.

41 indicates collars which are rotatably mounted upon the shaft 38 and are held in position by collars 42.

43 indicates arms which are secured to and preferably formed integral with collars 41, one upon each of said collars.

44 indicates links which are pivotally connected at one end to the upper ends of the arms 43 and are provided at their other ends each with a fork 45 which straddles the shaft 26, as is best shown in Fig. 1. Near the outer end and inside of the fork 45, each of the links 44 is provided with a roller 46 which is in alinement with and is operated upon by one of the cams 28 to move the link inward,—that is, to the left in Fig. 1,—as the cam rotates and rocks the collars 41 correspondingly.

47 indicates retractile springs, one end of each of which is connected with a suitable fixed part of the framework, as cross-bar 48, and the other end is attached in any suitable manner to one of the arms 43. The springs 47 thus hold the rollers 46 against the cams 28 and move the arms 43 to the right as the cam surfaces recede in the rotation of the cams.

49 indicates arms which are secured to and preferably formed integral with collars 41 and extend upward therefrom.

It will be evident from the above description that as the arms 43 are rocked the arms 49 will be correspondingly rocked in a curve in the direction toward and away from the carrier 17.

50 indicates levers which are journaled upon the upper ends of the arms 49, one upon each arm. The outer ends of the levers 50 are pivotally connected with the upper ends of links 51. The links 51 extending

longitudinally downward are provided each near its lower end with an expanded portion 52 in which is formed a slot or opening 53 which straddles the shaft 38, as is best seen in Fig. 1. Upon the lower ends of the links 51 are mounted rollers 54 which are in registry with and are operated upon by the cams 40, as hereinafter described.

81 indicates rods which are connected at their upper ends to the outer arms of the levers 50 and are provided near their upper ends with collars 82 fixed thereon. The rods 81 pass downward and near their lower ends pass through lugs 83 secured one upon each of the arms 49 so that the rods 81 may move freely therein.

84 indicates expansion springs interposed between the lugs 83 and the collars 82. These springs 84 tend to push the short outer arms of the levers 50 upward and keep the rollers 54 against the cams 40, yieldingly holding the parts normally in the position shown in Fig. 1 and swinging the outer arms of the levers upward and the other arms downward when the rollers are freed from the rise of the cams as hereinafter described.

The forward arms 50^a of the levers 50 are connected by a crossbar 55 which forms also the fixed jaw of the gripping jaws which seize upon the paper as hereinafter described. The lower portion of its surface is provided with a number of cross grooves or notches 56 to permit of the passage below it of the grippers 32 on the delivery cylinder 31, as hereinafter described.

56 indicates a rock-shaft which is journaled in the arms 50^a of the levers 50 a suitable distance to the rear or inside of the crossbar or fixed jaw 55 and projects beyond one of the levers 50, as is best shown in Figs. 2 and 4.

57 indicates gripper jaws which are secured in any suitable manner upon the rock-shaft 56 and project forward below the fixed jaw or crossbar 55 so as to engage it to grip the paper, as hereinafter described.

58 indicates a collar secured to the rock-shaft 56 and provided with an arm 59 preferably integral therewith.

60 indicates a rod, the forward end of which is pivotally connected with the outer end of the arm 59 and the upper end of which passes through a lug 61 formed on the upper end of one of the arms 49.

62 indicates a spiral spring which is interposed between the lug 61 and the other end of the rod 60 and operates to rock the rock-shaft 56 so as to hold the gripper jaws 57 normally in yielding contact with the fixed jaw 55, and so as to return it to that position whenever the jaws are opened, as hereinafter described.

63 indicates a bar which connects the arms 49, preferably by passing through collars 49^a

upon the upper ends of the arms 49. The levers 50 are also preferably provided with collars 50^b through which the crossbar 63 passes.

64 indicates a bellcrank lever having arms 64^a and 64^b and secured in any suitable manner, as by collar 65, to the outer end of the rock-shaft 56.

66—67 indicate rollers which are mounted, respectively, upon the arms 64^a and 64^b of the bellcrank lever 64.

68 indicates a bracket secured upon the inside of one side of the frame 6 and carrying upon its lower end a cam 69 which lies in the path of the roller 67 in its movement hereinafter described so as to rock the lever to the right in Fig. 3 and open the jaws 57 at the proper time and allowing them to close as soon as the roller passes off of the cam.

70 indicates a bracket secured upon one side of the frame 6 upon the inside of the frame, and 71 indicates a cam mounted on said bracket 70. The cam 71 lies in the path of the roller 66 in its movement hereinafter described and operates to temporarily open the gripping jaws 57 when they reach the point for the delivery of the sheet to the delivery cylinder 31 as hereinafter described.

72 indicates an idler gear journaled on the frame and meshing with gear 37.

73 indicates a gear secured to the end of shaft 74 journaled in the frame and meshing with gear 72.

75 indicates pulleys mounted on the shaft 74.

76 indicates pulleys mounted on a shaft 77 journaled in a bracket 78 in frame 6.

79 indicates tapes which pass over pulleys 75—76 and move in the direction indicated by arrows.

80 indicates strippers which are mounted in the framework 6 in any suitable manner and at their upper ends engage the delivery cylinder 31 in the usual manner to strip the folded sheets therefrom when the grippers 32—32 release the sheet as hereinafter described.

The operation of the devices above described is as follows:—The sheet A coming from any suitable source as from a printing machine either folded or unfolded longitudinally passes between the cutting cylinders 7 and 8 and down between the guides 13 to the rotary carrier, where its lead end is seized by the grippers 18 and carried around with the carrier. In the meanwhile, the arms 49 are being rocked by the cam 28 and its connections toward the carrier, the gripping jaws following the upper portion of the path shown in dotted lines in Fig. 1. As the carrier rotates, the blade comes into engagement with the paper so as to force it outward as the gripping jaws are brought into operative relation with the blade. Just

before they have been brought into operative relation, the roller 67 has met the cam 69 and the jaws 57 have been opened to engage the sheet. As the jaws are opened, the blade 21 tucks the sheet of paper between the gripping jaws 57 and the fixed jaw 55, which are immediately brought together upon the paper by the passing of the roller 67 away from the cam 69. The forward ends of the levers 50^a being rocked downward by roller 54 passing from the cam portions of the cams 40, it will be seen that the gripping jaws are traveling the descending portions of the dotted curve at this time,—that is to say, they are traveling at the same speed as the folding blade 21 and in the same direction. The parts are so timed that as the sheet is seized between the gripping jaws and the folding blade, the arms 49 begin to move backward. The radius of the swing of these arms and the position of the lever 50 thereon and of the other parts is such that in this backward movement the jaws travel along the lower side of the dotted path, shown in Fig. 1, so as to travel substantially tangentially to the cylinder 31 and to be in that position at the moment that by its rotation the grippers 32 passing under the slots 56 in the fixed bar 55 and opened by the cam 34 are ready to seize the lead folded edge of the sheet, which, stripped from the cylinder 17, is being carried forward by the gripping jaws. As soon as these jaws are tangential to the cylinder 31, the roller 66 rides the cam 71 so as to open the gripping jaws 57 and at the same moment the cam 34 operates to close the grippers 32 upon the lead edge of the sheet, which, thus folded transversely, is carried around on the delivery cylinder 31 until engaged by the strippers 80, at which time, the grippers 32 opening, the strippers 80 strip the sheet from the delivery cylinder and deliver it to the moving tapes 79. During this time, until the point of delivery of the sheet, the roller 54 has been riding upon the circular portion of the cam 40. At this moment the rise of the cam begins to work, and at the same time the roller 46 passes from the rise of the cam 28 to its cylindrical portion and the springs 47 operate to move the arms 49 forward. Thus the arms 49, moving forward, the links 51 are moved downward by the cam 40, raising the forward arm 50^a of the lever 50 as it is moved forward, so as to bring it into position at the top of the dotted curve. At this time, the roller 54 is released from the rise of the cam 40 and the arms 50^a of the lever 50 descend so as to move the gripping jaws 55—57 in the same direction with and at the same speed as the folding blade 21, as above described. In the position shown in Fig. 1, the parts are so shown that the gripping jaws have closed upon the fold of the sheet

and are just beginning their forward motion, beginning to strip the sheet from the cylinder 17, the grippers 18 having been opened so as to release the lead edge of the sheet which had been by them carried
5 around with the cylinder 17. The cutting knives also have just severed the tail of the sheet, and the lead edge of the succeeding sheet is engaged between the coating cylinders.

I have spoken of the part 17 as a "carrier" and have shown it as a carrier, strictly speaking,—that is to say, a rotary cylinder or a skeleton cylinder containing grippers
15 or similar devices for engaging and carrying around the lead edge of the sheet, and this is the form that I prefer to use. It is not, however, necessary in many cases to the operation of the machine that the part 17
20 should be a carrier, strictly speaking,—that is to say, a rotating cylinder having devices such as grippers for engaging the lead edge of the sheet, as in many cases of use the fold may be equally well formed by simply allowing
25 the sheet to pass down between the part 17 and the folding jaws without having its lead end engaged and carried around. In using the word "carrier", therefore, in this specification, I have used it for convenience
30 and do not intend either in the specification or claims, when using the word "carrier" to confine myself to a cylinder or its equivalent having grippers to engage the lead end of the sheet. The term "carrier" is to be
35 understood as applied not only to such a carrier, strictly speaking, but to any rotating or similarly moving part carrying a folding blade to tuck the paper between the gripping jaws.

40 What I claim as my invention and desire to secure by Letters Patent is:—

1. In combination, a moving carrier, a folding blade carried thereby, a swinging frame, gripper jaws carried by said swinging
45 frame and adapted to engage a sheet of paper between them over said folding blade when brought into operative relation therewith, means for swinging said frame toward and away from said carrier, and means for
50 giving said gripper jaws a movement, independent of said frame, in the same general direction as said folding blade while in operative relation therewith.

2. In combination, a moving carrier, a folding blade thereon, a swinging frame,
55 levers mounted on said swinging frame, gripping jaws carried by said levers and adapted to grip a sheet of paper over said folding blade, means for swinging said
60 swinging frame to move said gripper jaws toward and away from said carrier and into and out of operative relation with said folding blade, and means for swinging said
65 levers on said frame to cause said gripper jaws during their operative relation with

said folding blade to move in the same general direction therewith.

3. In combination, a moving carrier, a folding blade thereon, a swinging frame, levers
70 mounted on said swinging frame, gripping jaws carried by said levers and adapted to grip a sheet of paper over said folding blade, means for operating said gripping
75 jaws at suitable intervals, means for swinging said swinging frame to move said gripper jaws toward and away from said carrier
80 into and out of operative relation with said folding blade, and means for swinging said levers on said frame to cause said gripper jaws during their operative relation with
85 said folding blade to move in the same general direction therewith.

4. In combination, a moving carrier, a folding blade thereon, a swinging frame,
85 levers, mounted on said swinging frame, gripping jaws carried by said levers and adapted to grip a sheet of paper over said folding blade, means for operating said
90 gripping jaws at suitable intervals, means for swinging said swinging frame to move said gripper jaws toward and away from
95 said carrier into and out of operative relation with said folding blade, and means for swinging said levers on said frame to cause said gripper jaws during their operative
100 relation with said folding blade to move in the same general direction therewith and at substantially the same speed.

5. In combination, a moving carrier, a folding blade thereon, a swinging frame, levers
100 mounted on said swinging frame, a fixed gripping jaw carried by one of said levers, one or more gripping jaws movable with relation to said fixed gripping jaw and carried
105 by the other of said levers, mechanism for operating said movable gripping jaws to close them upon said fixed jaw to seize the paper over said folding blade and to open
110 them to release the folded edge, means for swinging said frame to move said gripping jaws toward and away from said carrier
115 and into and out of operative relation with said blade, and means for swinging said levers on said frame to cause said gripping jaws during their operative relation with
120 said folding blade to move in the same general direction therewith.

6. In combination, a moving carrier, a folding blade thereon, a swinging frame,
120 levers mounted on said swinging frame, a fixed gripping jaw carried by the ends of one of said levers, one or more gripping jaws movable with relation to said fixed
125 gripping jaw and carried by the other of said levers, mechanism for operating said movable gripping jaws to close them upon
130 said fixed jaw to seize the paper over said folding blade and to open them to release the folded edge, means for swinging said frame to move said gripping jaws toward

and away from said carrier and into and out of operative relation with said blade, and means for swinging said levers on said frame to cause said gripping jaws during their operative relation with said folding blade to move in the same general direction therewith and then upward during their return movement toward said carrier.

7. In combination, a moving carrier, a folding blade thereon, a swinging frame, levers mounted on said swinging frame, a fixed gripping jaw carried by the ends of one of said levers, one or more gripping jaws movable with relation to said fixed gripping jaw and carried by the other of said levers, mechanism for operating said movable gripping jaws to close them upon said fixed jaw to seize the paper over said folding blade

and to open them to release the folded edge, a delivery cylinder, means for swinging said frame to move said gripping jaws toward and away from said carrier and into and out of operative relation with said blade, and means for swinging said levers on said frame to cause said gripping jaws to move in a path which, during their operative relation with the folding blade, shall be in the same general direction therewith, then, during their movement away from said carrier, shall be tangent to the delivery cylinder, and then upward and forward toward said carrier.

HANS C. SCHROEDER.

Witnesses:

C. E. PICKARD,
M. D. DE BUSK.