

E. H. COTTRELL.
CUTTING AND FOLDING MACHINE.
APPLICATION FILED DEC. 15, 1906.

1,047,503.

Patented Dec. 17, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

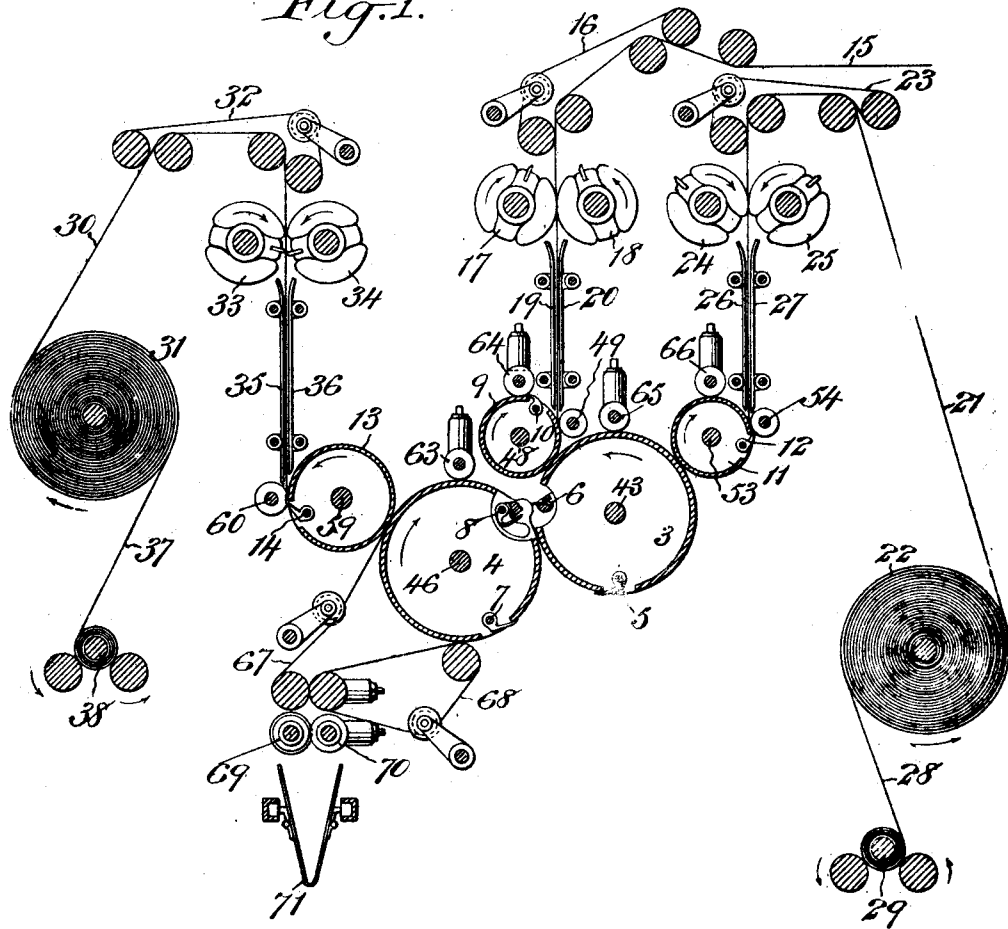
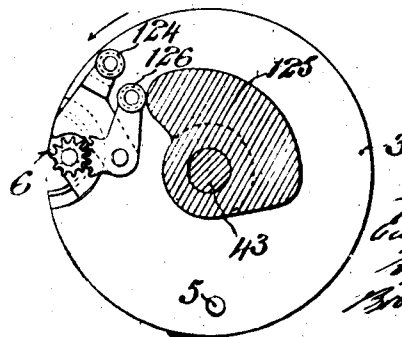


Fig. 6.



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3 SHEETS—SHEET 2.

Fig. 2.

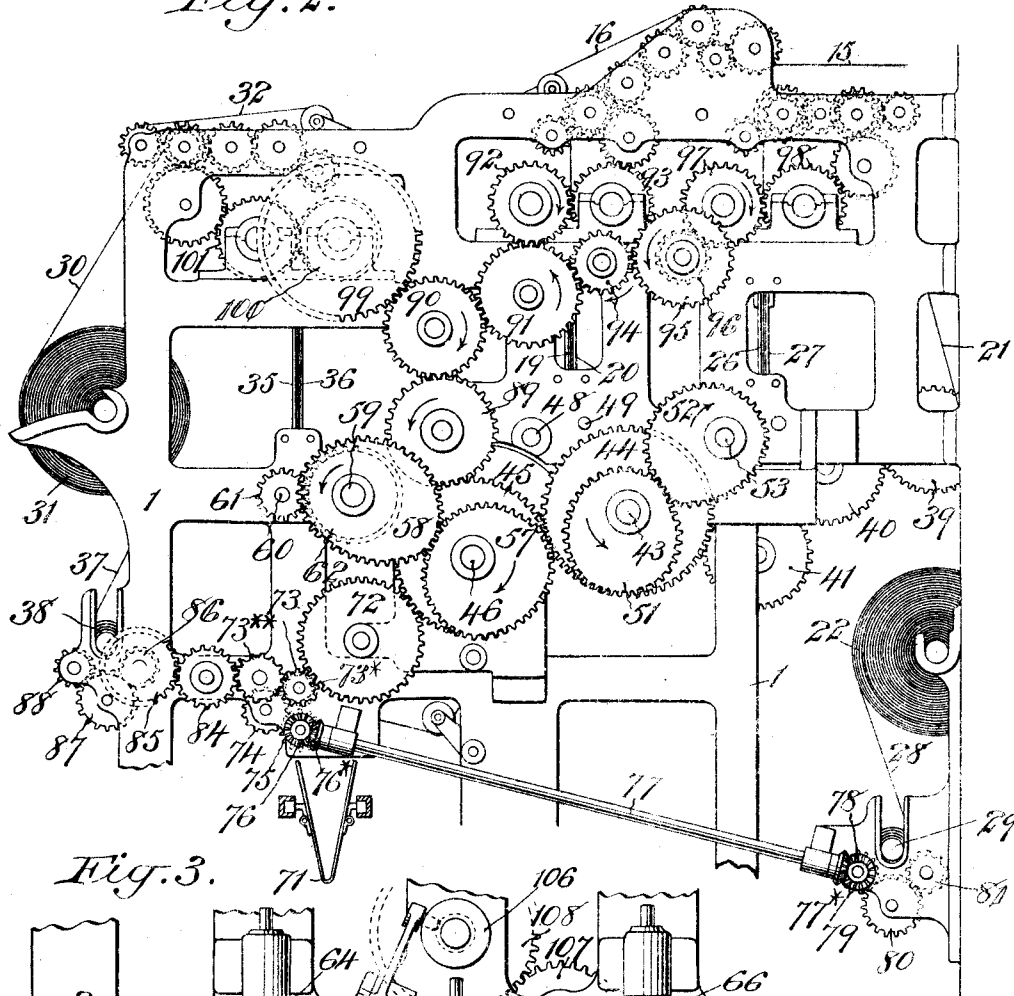


Fig. 3.

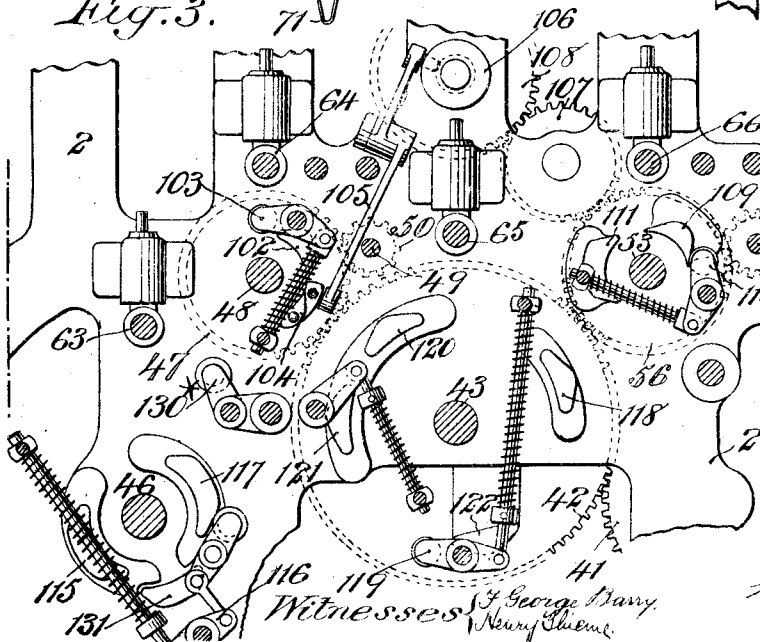
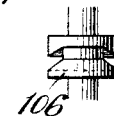


Fig. 3a.



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3 SHEETS—SHEET 3.

Fig. 4.

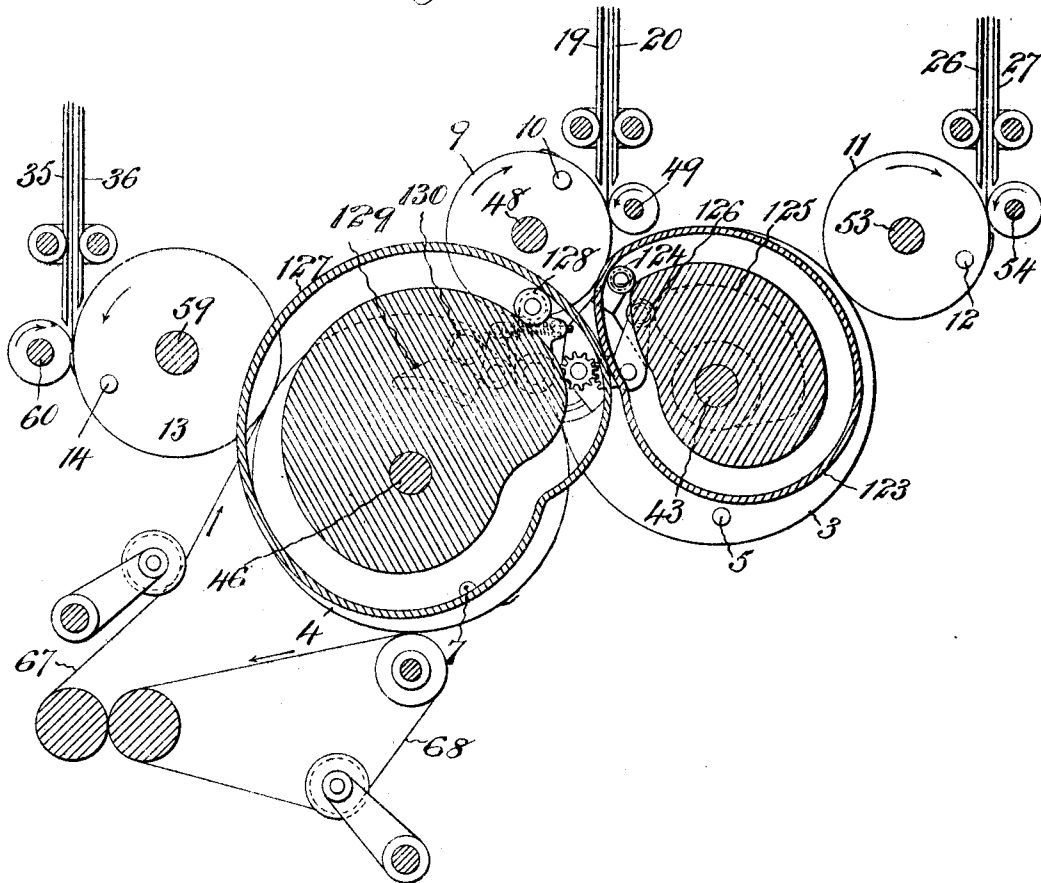
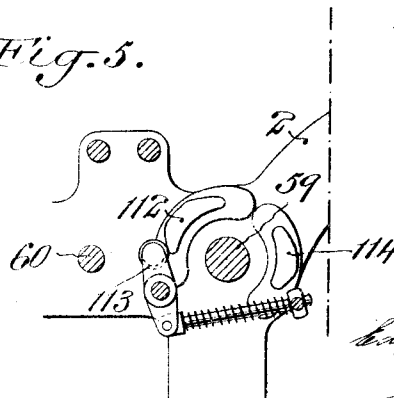


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDGAR H. COTTRELL, OF STONINGTON, CONNECTICUT, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CUTTING AND FOLDING MACHINE.

1,047,503.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed December 15, 1906. Serial No. 347,927.

To all whom it may concern:

Be it known that I, EDGAR H. COTTRELL, a citizen of the United States, and resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Cutting and Folding Machines, of which the following is a specification.

This invention relates to an improvement in cutting and folding machines and has particularly for its object to provide novel means for associating and folding together sheets cut from the printed web fed from the press with cover and insert sheets cut and fed from previously printed webs, the mechanisms being so arranged that a plurality of sheets cut from the web fed from the main press may be collected and then assembled with a sheet cut and fed from the previously printed insert supply and a sheet cut and fed from the previously printed cover supply, and the whole folded together and delivered to a predetermined point.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through a portion of a cutting and folding machine embodying my invention. Fig. 2 is a view in side elevation showing the geared connections for driving the several parts at their proper speeds with relation to one another, Fig. 3 is an enlarged detail section taken inside the side framing showing the arrangement of cams for controlling the operations of the grippers on certain of the several cylinders, Fig. 3^a is a detail plan of one of the cams for controlling the operation of the opening cam for the grippers on the sheet collecting cylinder, Fig. 4 is an enlarged detail section showing the arrangement of cams for actuating the folding mechanism of the folding cylinders, Fig. 5 is a detail section on an enlarged scale showing the arrangement of cams for controlling the operation of the cover sheet transfer cylinder, and Fig. 6 is a detail section on an enlarged scale showing the cam for controlling the movement of the floating folding blade on the male folding cylinder.

The side frames of the machine are denoted by 1 and 2. Male and female folding cylinders 3, 4, are mounted between the side frames, the male cylinder being provided with a set of grippers 5 and a floating folding blade 6 and the female folding cylinder being provided with a set of grippers 7 and

floating folding jaws 8, which jaws are arranged to coact with the blade 6 of the male folding cylinder.

A collecting cylinder 9 is arranged adjacent to the male folding cylinder 3 and it is provided with a set of grippers 10. An insert transfer cylinder 11 is located adjacent to the male folding cylinder 3, which transfer cylinder is provided with a set of grippers 12. A cover sheet transfer cylinder 13 is located adjacent to the female folding cylinder 4 and it is provided with a set of grippers 14. The printed web 15 is fed from the main press, not shown herein, past feeding tapes 16 through rotary cutters 17, 18, and from thence between stationary guides 19, 20 into position to have the advance edges of the sheet engaged by the set of grippers 10 on the collecting cylinder 9. A previously printed insert web 21 leads from the roll 22 past feeding tapes 23 through rotary cutters 24, 25 and from thence between stationary guides 26, 27, into position to have the advance edges of the sheets engaged by the set of grippers 12 on the transfer cylinder 11. The previously printed insert web 21 may be wound with an offset web 28 for preventing the smutting of the insert web, the offset web being wound off the web 22 on to the roll 29 as the insert web is unwound from the roll 22.

A previously printed cover web 30 leads from a roll 31 past feeding tapes 32 through rotary cutters 33, 34, and from thence between stationary guides 35, 36, into position to have the advance edges of the sheets engaged by the set of grippers 14 of the transfer cylinder 13. The previously printed cover web 30 may be wound with an offset web 37 for preventing the smutting of the cover web, the offset web being wound off the roll 31 on to the roll 38 as the cover web is unwound from the roll 31.

The several mechanisms are driven from the press through the train of gears 39, 40, 41, the gear 41 meshing with a gear 42 fixed to the shaft 43 of the male folding cylinder 3. The female folding cylinder 4 is driven at the same speed as the cylinder 3, by means of a gear 44 on the shaft 43 which meshes with a gear 45 on the shaft 46 of the female folding cylinder 4.

The collecting cylinder 9 is driven two revolutions to one of the main folding cylinder 3, by a gear 47 fixed to the shaft 48 of

the cylinder 9, which gear meshes with the gear 42 of the cylinder 3. The feed roller shaft 49 for the cylinder 9 is driven from the said cylinder by a gear 50 which meshes

5 with the gear 47.
The previously printed insert sheet transfer cylinder 11 is driven a revolution for every revolution of the male folding cylinder 3 but at varying speeds, by irregular
10 gears, one gear 51 being fixed to the shaft 43 of the cylinder 3 and the other gear 52 being fixed to the shaft 53 of the said transfer cylinder 11. The feed roller shaft 54 for the cylinder 11 is provided with a gear 55 which
15 meshes with a gear 56 fixed on the shaft 53 of the cylinder 11. The previously printed cover sheet transfer cylinder 13 is driven a revolution for every revolution of the female folding cylinder 4 but at varying speeds, by
20 irregular gears, the gear 57 being fixed to the shaft 46 of the female folding cylinder and the gear 58 being fixed to the shaft 59 of the transfer cylinder 13. The feed roller shaft 60 for the cylinder 13 is provided with
25 a gear 61 which meshes with a gear 62 fixed to the shaft 59 of the transfer cylinder 13.

Sheet pressure rollers 63, 64, 65, 66, engage the peripheries of the cylinders 4, 9, 3 and 11 respectively, for holding the sheets
30 against the peripheries of these cylinders when the sheets are disengaged from their grippers. Carrying tapes 67, 68 are arranged to convey the assembled and folded group of press, insert and cover sheets from
35 the female folding cylinder 4 through slitters 69, 70, to a predetermined point, such, for instance as a collecting pocket carrier 71, like that shown in my United States Letters Patent No. 749,362 dated January 12,

40 1904.

The insert offset roll 29 is driven from the gear 45 of the cylinder 4, through the train of gears 72, 73, 73*, 74, 75, 76, 76*, shaft 77 and train of gears 77*, 78, 79, 80, 81. The
45 cover offset roll 38 is driven from the gear 72 through a train of gears 73, 73**, 84, 85, 86, 87, 88. The rotary cutters 17, 18, are driven from the gear 45 through a train of gears 89, 90, 91, 92, 93, and the rotary cutters 24, 25 are driven from the gear 91
50 through a train of gears 94, 95, 96, 97, 98. The rotary cutters 33, 34, are driven from the gear 90 through a train of gears 99, 100, 101. The web feeding tapes 23, 16 and 32
55 are driven from their respective cutters by suitable gearing which need not be specifically described.

The set of grippers 10 on the sheet collecting cylinder 9 is opened every revolution
60 to receive the advance edge of a sheet from the main press by means of a fixed cam 102 which engages the gripper lever 103 at the proper time. The set of grippers 10 is opened every second revolution of the cylinder 9 to transfer a collected group of two

sheets from the cylinder 9 to the set of grippers 5 on the male folding cylinder 3, by means of a movable opening cam 104, which cam is thrown into and out of position to engage the lever 103 by means of a rock
70 lever 105 operated by a cam 106 driven from the shaft 53 of the cylinder 11 through gears 107, 108. The set of grippers 12 on the insert sheet transfer cylinder 11 is opened every revolution to receive the advance edge
75 of a sheet from the cutters 24, 25, by a stationary cam 109, which is arranged in position to engage the gripper opening lever 110 at the required time. This set of grippers 12 is opened every revolution of the cylinder
80 11 to transfer the insert sheet to the set of grippers 5 on the male folding cylinder 3, by means of a fixed cam 111 which engages the lever 110 at the proper point.

The set of grippers 14 on the cover sheet transfer cylinder 13 is opened to receive the
85 advance edge of the cover sheet as it leaves the guides 35, 36, by means of a fixed cam 112 which is arranged in position to engage the gripper opening lever 113 at the proper
90 time. Another fixed cam 114 is arranged in position to engage the lever 113 at the proper time to transfer the advance edge of the cover sheet from the set of grippers 14 to the set of grippers 7 on the female folding
95 cylinder 4.

A fixed cam 115 is arranged in position to engage the opening lever 116 of the set of grippers 7, at the proper time to receive the
100 advance edge of the cover sheet from the set of grippers 14. A second fixed cam 117 is arranged in position to engage the lever 116 of the set of grippers 7 at the proper time to transfer the advance edge of the cover sheet to the set of grippers 5 on the male folding
105 cylinder 3.

A fixed cam 118 is arranged in position to engage the opening lever 119 of the set of grippers 5 on the male folding cylinder 3 at the proper time to receive the advance
110 edge of the insert sheet from the transfer cylinder 11. A second fixed cam 120 is arranged in position to engage the lever 119 at the proper time to open the set of grippers 5 to receive the collected group of two sheets
115 from the main press. A third fixed cam 121 is arranged in position to engage the lever 119 to open the set of grippers 5 to receive the advance edge of the cover sheet from the set of grippers 7. A fourth fixed cam 122
120 is arranged in position to engage the lever 119 to open the set of grippers 5 to release the advance edges of the assembled group of sheets at the proper time of folding the same from the male folding cylinder on to the
125 female folding cylinder.

The coaction of the folding devices on the cylinders 3 and 4 is obtained as follows: A fixed box cam 123 is arranged to control
the floating movement of the blade 6 130

through the truck roller 124 and a cam 125 is arranged to control the tucking movement of the said blade by its engagement with the stud roll 126. A fixed cam 127 is arranged to control the floating of the folding jaws by its engagement with the truck roller 128 and a fixed cam 129 is arranged to control the opening of said jaws by its engagement with the stud roll 130. The opening of the floating jaws to release the folded signature at the proper time to permit it to be fed between the tapes 67, 68 is controlled by a stationary cam 131, which is engaged by a stud roller 130*.

The movements of the parts hereinabove described are so timed with respect to each other that the rotary cutters 17, 18 and the sheet collecting cylinder 9 complete two revolutions to one revolution of the folding cylinders. The rotary cutters 24, 25, for the insert web and their transfer cylinder 11, rotate one revolution for one revolution of the folding cylinders so that one insert sheet is transferred to the male folding cylinder for two sheets from the main web delivered from the collecting cylinder 9. The irregular gears 51, 52, are so shaped that the grippers 12 will be caused to travel at the speed of the insert web at the time of engaging the advance edges of the insert sheet and will be caused to travel at the surface speed of the male folding cylinder at the time that the advance edge of the insert sheet is transferred to the grippers 5. The rotary cutters 33, 34, for the cover web and their transfer cylinder 13, complete one revolution for every revolution of the folding cylinders. The irregular gears 57, 58 are so shaped that the cylinder 13 will be caused to travel at the speed of the cover web at the time the grippers 14 engage the advance edge of the cover sheet and at the surface speed of the female folding cylinder 4 at the time that the advance edge of the cover sheet is transferred to the grippers 7.

In operation, the cutters 24, 25, cut successive sheets from the insert web and feed them between the guides 26, 27 into position to have the advance edge of an insert sheet engaged by the grippers 12. One insert sheet is transferred to the grippers 5 on the male folding cylinder 3 as the grippers 5 and 12 are brought together. In the meantime the cutters 33, 34, cut successive sheets from the cover web and feed the sheets between the guides 35, 36, into position to have the advance edge of each sheet engaged by the grippers 14 on the transfer cylinder 13. One cover sheet is transferred to the grippers 7 of the female folding cylinder 4 every revolution thereof when the grippers 7 and 14 are brought together. The rotary cutters 17, 18, which are driven at twice the speed of the cutters for the insert and cover sheets, sever sheets from the web fed from

the main press and feed them down between the guides 19 and 20. The collecting cylinder 9 is arranged to have its grippers 10 collect two sheets thereon and then transfer the two sheets to the grippers 5 on the male folding cylinder 3 when the said grippers come together. As the grippers 5 and 7 on the two folding cylinders come together, the cover sheet on the female folding cylinder will be transferred to the male cylinder, the grippers 5 on the male cylinder then engaging the advance edge of one insert sheet, two sheets from the main press and one cover sheet. As the folding mechanism of the two cylinders 3 and 4 is brought into coaction, the grippers 5 are opened to release the advance edges of the collected group of sheets. The folded signature is then brought down between the tapes 67, 68 and the jaws 8 of the folding mechanism are opened to permit the tapes 67, 68, to feed the folded signature between the slitters 69, 70, from whence the signatures drop into the pockets in the carrier 71. The means for imparting successive movements to the pocket carrier to collect a series of folded signatures therein forms no part of the present invention and will therefore not be specifically described, it being understood that the folded signature from the tapes may be slit into the required number of smaller signatures and then deposited at proper intervals into the pocket carrier to produce the result desired.

It can be readily understood that instead of transferring the advance edge of the cover sheet from the folding cylinder 4 to the folding cylinder 3 to be combined with the insert and main web sheets thereon, the opening of the grippers may be so timed that the cover sheet will not be transferred to the cylinder 3 but will be fed between the folding cylinders and have its advance edge released from the grippers 7 in ample time to permit the assembled insert, main web and cover sheets to be folded together and fed between the tapes 67, 68.

It will be seen that the machine as hereinabove set forth accomplishes the assembling and folding together of sheets from the main press and from the insert and cover supplies without the necessity of employing formers, turning-bars or carrying tapes.

What I claim is:

1. Folding cylinders, a cylinder for transferring one insert sheet at a time to one of the folding cylinders, a cylinder for delivering a plurality of main web sheets at a time to the said folding cylinder and a cylinder arranged to transfer cover sheets one at a time to the other folding cylinder.

2. Folding cylinders, a cylinder for transferring insert sheets one at a time to one of the folding cylinders, a cylinder for delivering a plurality of main web sheets to said

folding cylinder, a cylinder arranged to transfer cover sheets one at a time to the other folding cylinder and means for folding the sheets together and delivering them at a predetermined point.

3. Folding cylinders, and insert sheet and cover sheet transfer cylinders, each arranged to travel one revolution to one revolution of the folding cylinders.

10 4. Folding cylinders, insert sheet and cover sheet transfer cylinders arranged to travel one revolution to one revolution of the folding cylinders and means for imparting variable surface speeds to the insert sheet and cover sheet transfer cylinders.

15 5. Folding cylinders, a main web sheet collecting cylinder arranged to travel two revolutions to one revolution of the folding cylinders, and insert sheet and cover sheet transfer cylinders arranged to travel one

revolution to one revolution of the folding cylinders.

6. Folding cylinders, a main web sheet collecting cylinder arranged to travel two revolutions to one revolution of the folding cylinders, insert sheet and cover sheet transfer cylinders arranged to travel one revolution to one revolution of the folding cylinders and means for imparting variable surface speeds to the insert sheet and cover sheet transfer cylinders.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 13th day of December 1906.

EDGAR H. COTTRELL.

Witnesses:

FREDK. HAYNES,
LIDA M. EGBERT.