

(No Model.)

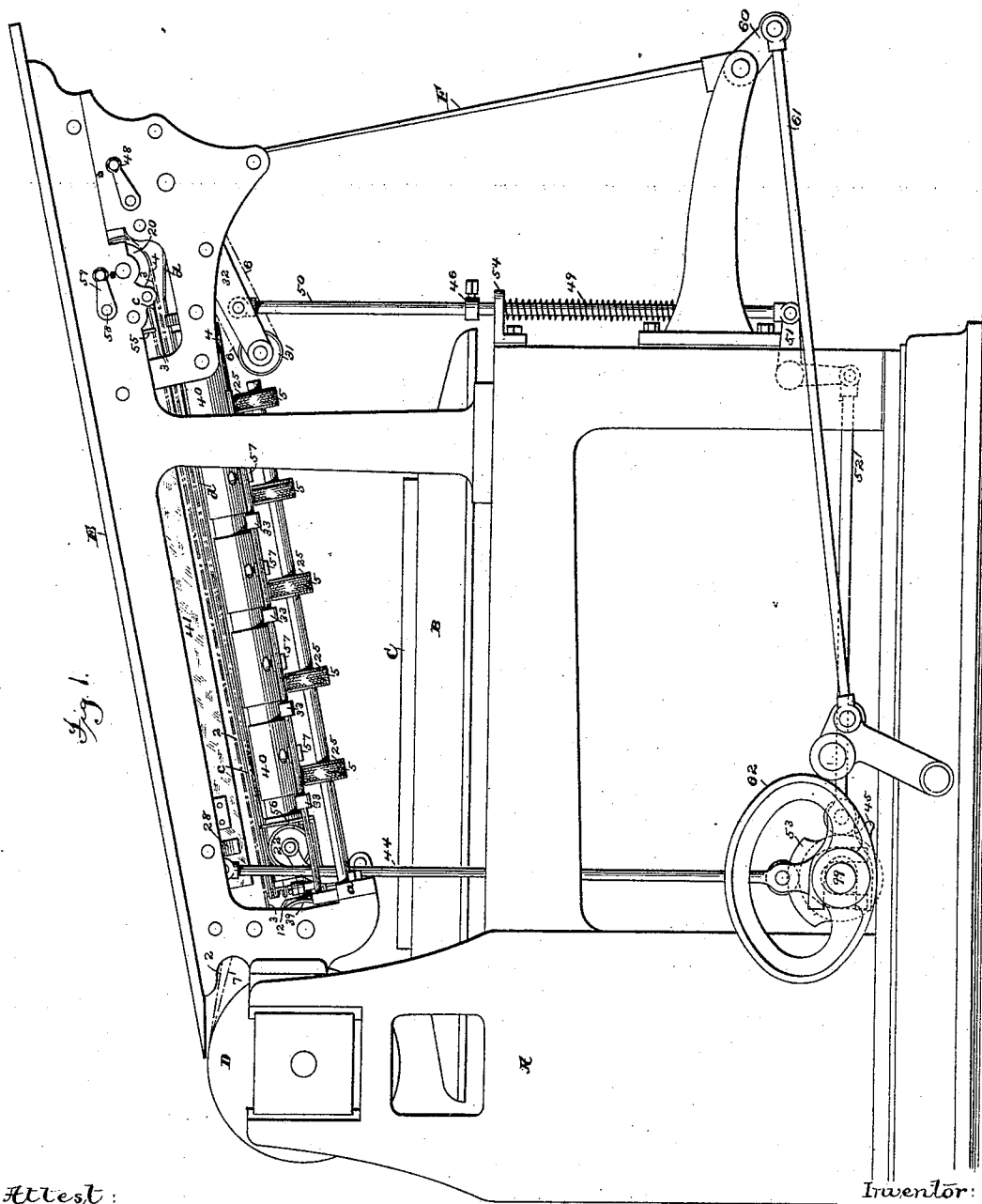
3 Sheets—Sheet 1.

L. C. CROWELL.

COMBINED PRINTING PRESS AND FOLDING MACHINE.

No. 471,102.

Patented Mar. 22, 1892.



Attest:

Geo H. Bott.
J. A. Hoovey.

Inventor:

Luther C. Crowell
by Munson & Philipp

Atty:

(No Model.)

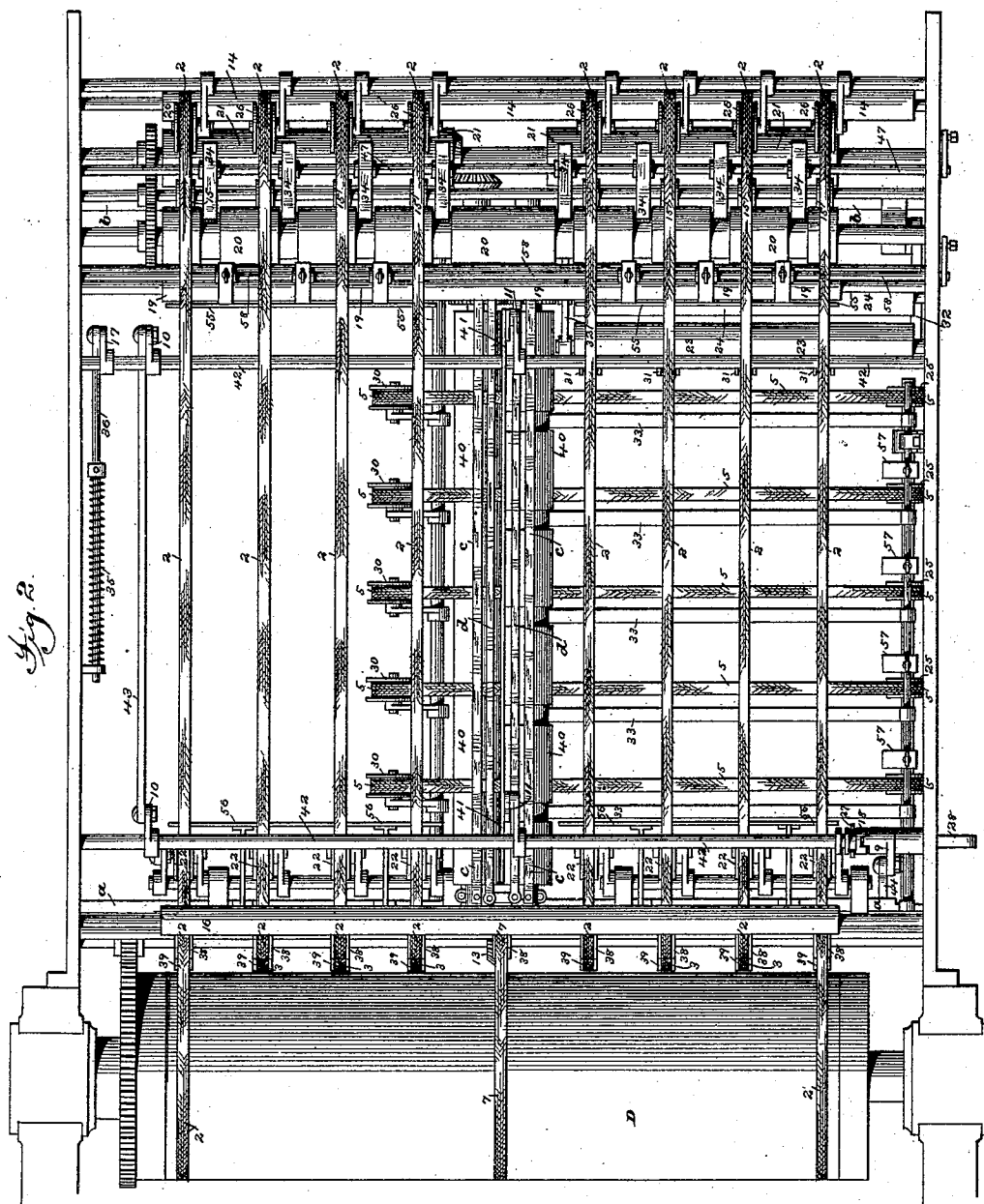
3 Sheets—Sheet 2.

L. C. CROWELL.

COMBINED PRINTING PRESS AND FOLDING MACHINE,

No. 471,102.

Patented Mar. 22, 1892.



Attest:
Geo. H. Botts
J. A. Horvay

Inventor:
Luther C. Crowell
By Munroe & Phillips

Attys:

(No Model.)

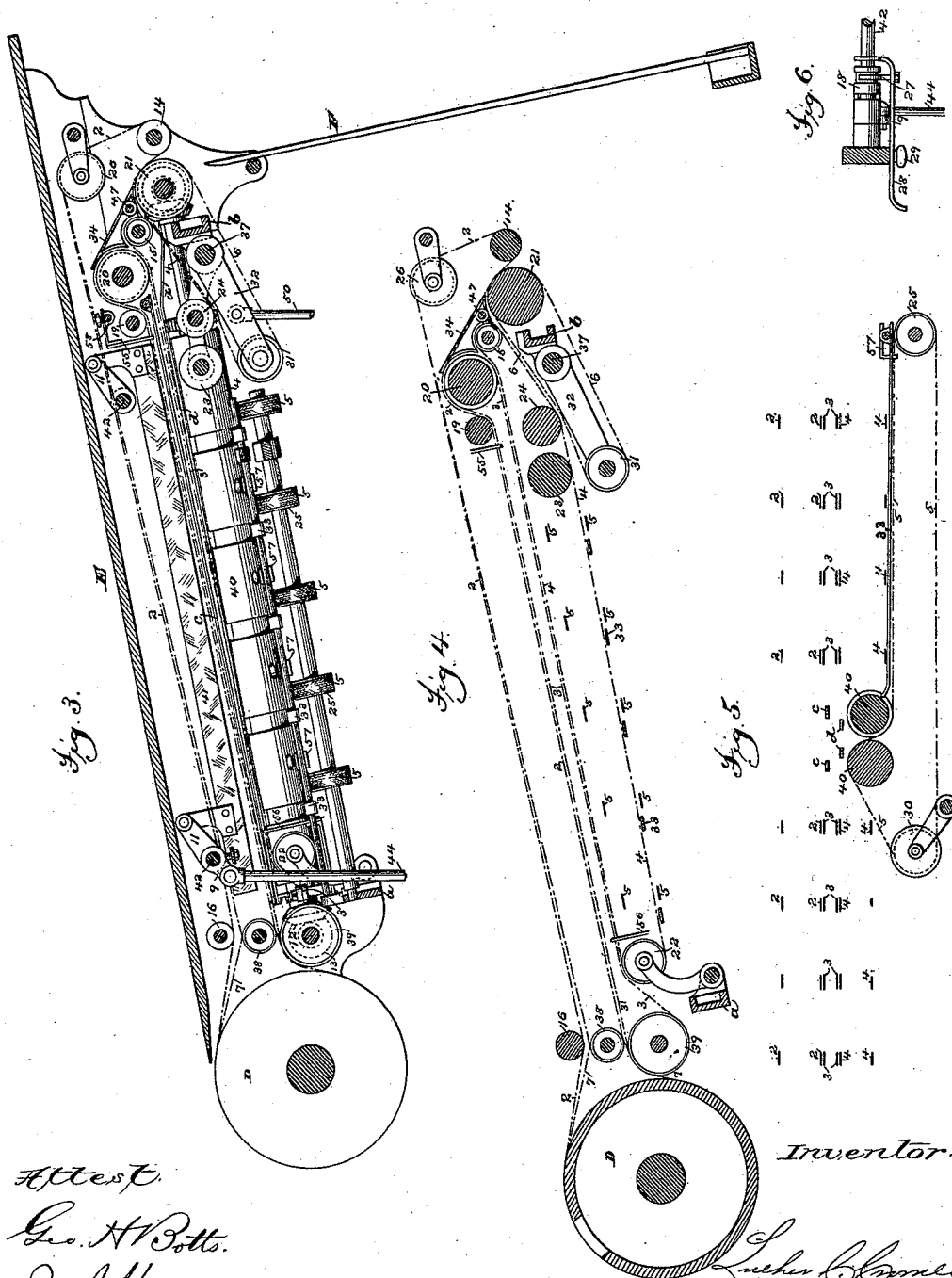
3 Sheets—Sheet 3.

L. C. CROWELL.

COMBINED PRINTING PRESS AND FOLDING MACHINE.

No. 471,102.

Patented Mar. 22, 1892.



Attest.
Geo. H. Botts.
J. A. Novay

Inventor

Lucas C. Crowell
by
Munson & Phillips
Attys.

UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE, STEPHEN D. TUCKER, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

COMBINED PRINTING-PRESS AND FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 471,102, dated March 22, 1892.

Application filed July 22, 1886. Renewed August 6, 1891. Serial No. 401,818. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in a Combined Printing-Press and Folding Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a folding mechanism which is especially designed and adapted to be used in connection or combined with that class of printing-machines which are known as "cylinder-presses."

It is the object of the invention to produce a combined cylinder-press and folding mechanism in which the several parts shall be so constructed and organized that the entire folding mechanism will be located under the feed-board of the press and in the path of travel which the sheets take in an ordinary cylinder-press in passing from the impression-cylinder to the fly. By this means the combined press and folder is made to occupy no more space than that occupied by the press alone.

It is also the object of the invention to provide a combined press and folder of this class which shall be capacitated by very slight adjustments to deliver the sheets either in an unfolded or folded condition, and in either case to the same fly or piling mechanism.

It is also the object of the invention to provide a folding mechanism of this character which shall be so constructed that it can be combined with presses already in existence without the necessity of materially changing their organization.

As a full understanding of the invention can be best given by a full description of a combined press and folder embodying the same, all further preliminary description will be omitted and a full description given, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a combined press and folding mechanism embodying the present invention, so much of the press being

shown as is necessary to illustrate the manner in which the folder is combined therewith. Fig. 2 is a plan view of the same, the feed-board being removed. Fig. 3 is a sectional elevation of the same. Figs. 4 and 5 are diagrammatic views illustrating the arrangement of the tapes by which the sheets are conveyed from the impression-cylinder to the fly, and Fig. 6 is an enlarged detail which will be hereinafter referred to.

Referring to said figures, it is to be understood that A represents a portion of the framework, B the bed, C the form, D the impression-cylinder, E the feed-board, and F the fly-frame, of an ordinary cylinder printing-press. The bed B is provided with any of the ordinary connections, (not shown,) by which it is reciprocated in the usual manner, and the cylinder D is also driven in any of the common ways, so as to rotate in the direction indicated by the arrow. The cylinder is also provided with the usual sheet-grippers. (Not shown.) The feed-board E is also arranged in the usual or substantially the usual position above and at one side of the cylinder, and the fly-frame F is arranged beneath the outer end of the feed-board, as is also usual.

The folding mechanism is located directly beneath the feed-board and between the impression-cylinder and the fly, and is so arranged that the sheets may be operated upon by it and folded as they pass from the impression-cylinder to the fly without departing substantially from the usual path of travel. The folding mechanism proper consists of a pair of folding-rolls and a vibrating folding-blade 41, which operates to fold the sheets into the bite of the rolls in the usual manner. The rolls 40 are arranged at right angles to the impression-cylinder about midway of its length and are supported at their inner ends by a transverse bar *a* and at their outer ends by a similar bar *b*. These rolls are geared together in the usual manner and receive motion from a bevel-gear 12 upon the shaft of one of the rolls, which engages with a similar gear 13 upon the transverse shaft of the usual delivery pulleys or rolls 39, which receive mo-

tion from the impression-cylinder. The folding-blade 41 is arranged above the folding-rolls 40 and is connected to arms 11, extending from a pair of transverse rock-shafts 42, which shafts are also provided with arms 10, which are connected by a horizontal rod 43, whereby both shafts are moved in unison. One of the shafts 42 is provided with an arm 17, which is connected to a rod 36, having a spring 35, the tendency of which is to rock the shafts 42, so as to hold the blade 41 in its raised position away from the rolls 40. The other of the shafts 42 is provided with an arm 9, to which is pivoted a vertical rod 44, which is bifurcated at its lower end and straddles the main shaft 99 and is provided with a bowl, which is acted on by a cam 45 on the main shaft in such manner as to lower the blade 41 at the proper time to fold each sheet into the bite of the rolls 40. The arm 9 is mounted loosely upon the shaft 42, but is arranged to be rigidly connected thereto by means of a sleeve 18, (see Fig. 6,) which is splined to the shaft 42, but is arranged to slide freely thereon, and is provided with a recess, which receives a corresponding tongue formed on the hub of the arm 9. The clutch thus formed is provided with an operating-handle 28, which extends outward at the side of the machine and is supported at its inner end by an eye, which slides freely on the shaft 42. This handle is provided with a fork 27, which rests in a circumferential groove formed in the sleeve 18. From this arrangement it results that by pulling and pushing on the handle 28 the sleeve 18 can be moved along the shaft 42, so as to lock and release the arm 9 to and from the shaft, and thus throw the blade 41 into and out of operation. When the arm 9 is released from the shaft, it will be moved idly by the cam 45 and the blade will be held in its raised position by the spring 35. The operating-handle 28 is provided with a set-screw 29, by which it can be secured so as to hold the sleeve 18 in either position to which it is shifted.

The folding mechanism is provided with five sets or series of co-operating sheet-conveying tapes 2 3 4 5 6, which operate to take the sheets from the cylinder D and convey them either directly to the fly F or to the folding-rolls and thence to the fly, according as it is desired that the sheets shall be delivered in an unfolded or in a folded condition. These tapes are arranged as follows: The series 2 pass between the usual delivery pulleys or rolls 38 39, located at the inner ends of the folding-rolls and in close proximity to the impression-cylinder, thence forward above the folding-rolls 40 and beneath a roll 19 and over a roll 20, located above and at the outer ends of the folding-rolls, thence downward in an inclined direction past a roll 21 and upward around a roll 14, and thence rearward around tightening-pulleys 26. From the pulleys 26 all of the tapes, except the two marginal ones, return directly around the pulleys 38. The

two marginal tapes of the series, however, pass beneath a roll 16 and thence around the impression-cylinder near its ends, returning over the end pulleys of the series 39. The series of tapes 3 pass around the pulleys 39, thence forward with the tapes 2 beneath the roll 19 and over the roll 20, and thence rearward above tightening-pulleys 22 to the pulleys 39. The tapes of the series 4 upon one side of the rolls 40 pass around a roll 15, located just beneath and in advance of the roll 20, thence beneath the roll 20 and rearward with the tapes 3 to the pulleys 22, and thence around the pulleys 22 and forward beneath a pair of rolls 23 24 to the roll 15. The rolls 23 24 extend inward only to the ends of the folding-rolls 40 and are journaled at their inner ends in a bracket extending from the bar b. The tapes of the series 4 upon the other side of the rolls 40 return from the pulleys 22 directly to the roll 15. The series of tapes 5 pass above one of the folding-rolls 40, thence between the rolls and beneath the other of the rolls and outward beneath, but out of contact with, the tapes 4 to the side of the machine, from which point they return around pulleys 25 and stretching-pulleys 30. The series 6 pass around pulleys 31, located beneath the roll 23 and mounted in the ends of swinging arms 32, which extend from the bar b, thence forward with the tapes 4 beneath the rolls 23 24 15 and with the tapes 2 around the roll 21, returning thence directly to the pulleys 31. In addition to the tapes already specified the cylinder D is provided with a single tape 7, which passes around the middle of the cylinder and above the central one of the pulleys 39 and returns around one of the pulleys 38.

Directly above the folding-rolls there are located two pairs of stationary guides *cd*, the former of which serve to support the middle of the sheets as they are carried forward between the tapes 2 3 and the latter to support the middle of the sheets as they are carried in the opposite direction between the tapes 3 4. There are also provided a series of stationary guides 33, which are located directly above and co-operate with the tapes 5, as will hereinafter appear. The space between the rolls 20 21 is bridged by a series of switches 34, which can be shifted so as to direct the sheets from between the tapes 2 3 into the bite of the tapes 3 4, so as to direct the sheets forward to the roll 21. In this latter case these switches also serve as guides, which co-operate with the tapes 2. The shaft 47, upon which the switches 34 are mounted, is provided with an arm 48, having a locking-bolt, by which the switches can be shifted to and secured in either of the positions just stated. The arms 32, in which the pulleys 31 are mounted, are rigidly secured to a rock-shaft 37, the inner end of which is mounted in a bracket extending from the bar b, while its outer end is journaled in the side frame. To one of the arms 32 there is pivoted a rod 50,

the opposite end of which is pivoted to one arm of a bell-crank lever 51, the other arm of which is pivoted to a rod 52, having a bowl or stud which is acted upon by a cam 53 upon the driving-shaft 99 in such manner as to periodically raise the arms 32 and bring the pulleys 31 into nipping contact with the roll 23. The rod 50 is provided with a spring 49, which acts against a bracket 54 upon the frame-work and the tendency of which is to move the rod 50 and pulleys 31 downward and hold the bowl on the rod 52 in contact with the cam 53. The rod 50 is also provided with an adjustable collar 46, arranged above the bracket 54, the purpose of which will appear when the operation of the mechanism is explained. The roll 21 is geared to one of the folding-rolls 40, and the rolls 21 15 20 are geared together, as shown. The folding mechanism thus organized is provided with three sets of stops 55, 56, and 57, which are arranged as follows: The stops 55 are located above the outer ends of the folding-rolls 40 and are arranged to be interposed in the path of the sheets as they pass forward between the tapes 23. These stops are mounted upon a rock-shaft 58, having a handle 59, by which it can be rocked, so as to carry the stops 55 into and out of operative position. The handle 59 is provided with a locking-bolt, by which the stops can be secured in either position. The stops 56 are located near the inner ends of the folding-rolls 40 and are interposed in the path of the sheets as they pass inward between the tapes 3 4. The stops 57 are located above the pulleys 25 and are interposed in the path of the sheets as they pass outward between the tapes 5 and guides 33. All of these stops will be made adjustable, so that their positions may be varied. The fly F is operated to pile the sheets by means of the usual spring (not shown) and is returned to and held in its raised position by means of the usual arm 60, connecting rod 61 and cam 62.

The operation of the combined press and folding mechanism thus organized is as follows: The sheets fed from the table E will be taken by the grippers of the cylinder D and presented to the form C to be printed in the usual manner. After being presented to the form the sheets will be directed off the cylinder and between the tapes 2 3 by the tape 7 and the marginal tapes 2. If it is desired to deliver the sheets in an unfolded condition—as, for example, when they are passed through the press the first time and are only printed on one side—the sleeve 18 will be shifted so as to disconnect the arm 9 from the shaft 42 and allow the folding-blade to remain idle and in its raised position. The shaft 58 will be rocked and secured in position to remove the stops 55 from the path of the sheets, and the switches 34 will be set in position to direct the sheets from the roll 20 to the roll 21. The pulleys 31 may also, if desired, be secured in their raised position, which can readily be

done by raising the pulleys and moving the collar 46 downward and setting it on the rod 50 directly above the bracket 54. The sheets will then, as they are directed off the cylinder, be carried forward by the tapes 2 3 above the guides *c* until they arrive at the roll 20, after which they will pass downward between the tapes 2 and switches 34 and will emerge from between the rolls 14 21 in front of the fly and be piled in a flat or unfolded condition. If, on the other hand, it is desired to deliver the sheets in a folded condition, the sleeve 18 will be shifted so as to connect the arm 9 to the shaft 42 and put the folding-blade 41 into operation, the switches 34 will be set in the position shown in the drawings, the collar 46 will be raised so as to allow the pulleys 31 to be vibrated, and if it is desired that the side of the sheet last printed shall be upon the outside of the sheet after it is folded the stops 55 will be lowered to the position shown. The cam 45 will also, if necessary, be shifted so as to properly time the movements of the folding-blade 41. The sheets will then, as they are directed off the impression-cylinder, be carried forward above the guides *c* by the tapes 2 3 until they arrive at the stops 55. The parts will be so timed that as the leading end of each sheet arrives at the stops 55 the blade 41 will be moved quickly downward, so as to double the sheet between the guides *c* and fold it into the bite of the rolls 40. As the folded sheets emerge from between the rolls 40 they will be carried outward toward the side of the machine between the tapes 5 and guides 33 until they arrive at the stops 57. The stops 55 are so positioned that the rear ends of the sheets will extend nearly or quite to the forward ends of the folding-rolls 40, from which it results that as the sheets are carried outward by the tapes 5 their rear ends, or what is then one of their sides, will project beyond the marginal tape of the series 5 and above the pulleys 31 and tapes 6. The parts will be so timed that as each of the folded sheets arrives at the stops 57 the arms 32 will be moved upward quickly, so as to carry the pulleys 31 into nipping contact with the roll 23. This will cause the side of the sheet, or what then again becomes its leading end, which projects above the pulleys 31 to be taken by the tapes 4 6 and carried forward between rolls 15 21, where it will be directed by the lower parts of the switches 34 between the tapes 2 6 and projected downward from between the rolls 14 21 in front of the fly, by which it will be laid upon the piling-table in a folded condition, with the side of the sheet last printed upon the outside of the folded sheet. If it is desired that the sheet should be so folded that the side of the sheet last printed will be upon the inside of the folded sheet, the adjustments will be the same, except that the stops 55 will be raised and the cam 45 shifted, if necessary, so as to properly time the movements of the folding-blade 41. The sheets will then be carried forward to the roll 20 and

will be directed inward between the rolls 15 20 and pass into the control of the tapes 3 4, by which they will be carried inward until they arrive at the stops 56. As each sheet arrives at the stops 56 it will be folded into 5 the bite of the rolls 40, after which the operation will be the same as already described. It will be observed that in this case, however, the sheets are so presented to the folding-rolls that when they are folded the side of the 10 sheet last printed is upon the inside of the folded sheet.

It will be seen from the foregoing that the combined printing and folding mechanism 15 thus organized is capacitated by very slight adjustments to deliver its product either in an unfolded condition or in a folded condition, as may be preferred, and that in either case the sheets are delivered to and piled by 20 the same fly. This is a feature of importance, as when the two sides of the sheets are to be successively printed by passing them twice through the press it is usually desirable that they should not be folded until they are 25 passed through the press the second time, or, in other words, until after they have been printed on both sides. In such case the folding mechanism can be thrown out of operation when the sheets are passed through the 30 press for the first time, so that the sheets will be piled in an unfolded condition after the first side has been printed, and when the sheets are passed through the press the second time to print the last side the folding mechanism can be thrown into operation, so 35 that the sheets will be delivered in a folded condition.

In printing newspapers on a cylinder printing-press it is usually most desirable that the 40 outside pages of the sheet should be printed last—that is to say, when the sheet is passed through the press the second time—and in such case it is of course necessary that the folding should be so done that the side last 45 printed will be upon the outside of the folded sheet. This can, as will be seen, be readily accomplished with the mechanism shown in the present case by lowering the stops 55 and properly adjusting the cam 45. The sheets 50 will then, as already stated, be so presented to the folding-rolls that the side last printed will be upon the outside of the folded sheet. There are cases, however, in which it is desirable that the sheets should be folded as 55 they are passed through the press for the first time—that is to say, after they have been printed on only one side. This is frequently the case in producing what are known as “patent insides,” where the papers for a large 60 number of small publishers are printed upon one side at a general office and are then distributed among the small offices to be printed upon the other side with local matter and news. In producing these patent insides it 65 is frequently desirable that the sheets should be folded once before being distributed among the small offices. Such folding not only re-

duces the sheets to more convenient dimensions for shipment, but makes it possible to print the remaining side of the sheets upon 70 a comparatively small press. When, therefore, the sheets are to be folded after only the first side has been printed, it is necessary, in order that the printing of the second side may be readily accomplished, that the folding 75 should be so done that the printed side will be upon the inside of the folded sheet.

It also sometimes happens that it is desirable, even when the sheets are not folded until they have been printed on both sides, that 80 they should be so folded that the side last printed will be upon the inside of the folded sheet. This also, as will be observed, can be readily accomplished by the mechanism shown in the present case by raising the stops 85 55 and properly adjusting the cam 45. The sheets will then, as already stated, be carried inward and presented to the folding-rolls in such position that the printed side of the sheet or the side last printed, as the case may 90 be, will be upon the inside of the folded sheet.

It will also be observed that in the combined press and folding mechanism herein shown the folding mechanism is so constructed and organized that it is located entirely be- 95 neath the feed-board of the press. By this means the size of the combined press and folder is not increased beyond that of the press alone and the folding mechanism is entirely out of the way both when in use and when 100 not in use. The feed-board also serves as a means of covering and protecting the folding mechanism.

It will also be observed that the sheets when they are delivered in an unfolded condition 105 take exactly the path of travel in passing from the impression-cylinder to the fly which they take in an ordinary cylinder-press, and that when they are delivered in a folded condition they take substantially the same course 110 and issue from the machine at the same point.

It will also be observed that the construction and organization of the folding mechanism is such that it can be applied to presses already in existence without the necessity of 115 making material alterations in their construction. The delivery-pulleys 38 39, the tapes 2 3, and the rolls 14 21 are found in and are arranged in the same or substantially the relation to each other in ordinary cylinder-presses 120 that they are in the present case.

If in any case it should not be desired to capacitate the machine to deliver the sheets in an unfolded condition—as, for example, when the machine is to be used exclusively 125 for printing patent insides or for printing the second side of the sheets—the switches 34 may be made stationary instead of movable, or the switches may be omitted and the tapes 2 carried inward around the pulleys 22, and 130 then outward above the roll 21, so as to take the place of the tapes 4; or if in any case it should not be desired to capacitate the machine to fold the sheets so that the side last

printed will be upon the outside of the folded sheet the stops 55 may be omitted. It is of course understood that pulleys may be used in place of the various rolls around which the

5 tapes pass, and vice versa.

It is usually desirable in printing newspapers upon a press of this character to impose the forms in such order and position as to make it necessary that the first fold should be made
10 longitudinally of the sheet—that is to say, in the direction of its travel through the machine. This, however, is not absolutely essential and may not in all cases be desirable. If, therefore, it should in any case be desirable to have
15 the fold made transversely instead of longitudinally of the sheet, the folding rolls 40 and blade 41 can be arranged parallel with instead of at right angles to the impression-cylinder, as shown in my application for Letters Patent
20 filed July 6, 1886, Serial No. 207,209.

The general arrangement of the folding mechanism beneath the feed-board, also the organization by which the sheets may be delivered either folded or unfolded, also the means
25 for driving the folding rolls and blades, also the vibrating pulleys, are not herein claimed, broadly, as these features are claimed in my companion applications filed July 6, 1886, Serial No. 207,209, and March 27, 1885, Serial
30 No. 160,180.

What I claim is—

1. The combination, with a cylinder printing-press, of the folding rolls and blade 40 41 and tapes arranged to convey the sheets outward past the rolls and then return them between the rolls and blade, substantially as described.

2. The combination, with a cylinder printing-press, of the folding rolls and blade 40 41, tapes arranged to convey the sheets outward
40 past the rolls and then return them between the rolls and blade, the tapes 5, and vibrating pulleys 31, substantially as described.

3. The combination, with a cylinder printing-press, of the folding rolls and blade 40 41 and tapes arranged to convey the sheets outward between the rolls and blade and then return them between said rolls and blade, substantially as described.

4. The combination, with a cylinder printing-press, of the folding rolls and blade 40 41, tapes arranged to convey the sheets outward between the rolls and blade and then return them between said rolls and blade, and the stops 55, substantially as described.

5. The combination, with a cylinder printing-press, of the folding rolls and blade 40 41, tapes arranged to convey the sheets outward between the rolls and blade and then return them between said rolls and blade, the tapes
60 5, and the vibrating pulleys 31, substantially as described.

6. The combination, with a cylinder printing-press and its fly, of the folding rolls and blade 40 41, tapes arranged to convey the
65 sheets past the folding-rolls and directly to the fly and to return the sheets inward between the folding rolls and blade, and switches arranged to direct the sheets inward or allow them to pass directly to the fly, substantially
70 as described.

7. The combination, with a cylinder printing-press and its fly, of the folding rolls and blade 40 41, tapes arranged to convey the sheets past the folding-rolls and directly to
75 the fly and to return the sheets inward between the folding rolls and blade, switches arranged to direct the sheets inward or allow them to pass directly to the fly, the tapes 5, and the vibrating pulleys 31, substantially as
80 described.

8. The combination, with a cylinder printing-press and its fly, of the folding rolls and blade 40 41, tapes arranged to convey the sheets between the folding rolls and blade and
85 directly to the fly and to return the sheets inward between the folding rolls and blade, the stops 55, switches arranged to direct the sheets inward or allow them to pass directly to the fly, the tapes 5, and vibrating pulleys
90 31, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

JAS. J. KENNEDY,
J. A. HOVEY.