

(No. Model.)

4 Sheets—Sheet 1.

L. C. CROWELL.

COMBINED PRINTING PRESS AND FOLDING MECHANISM.

No. 486,559.

Patented Nov. 22, 1892.

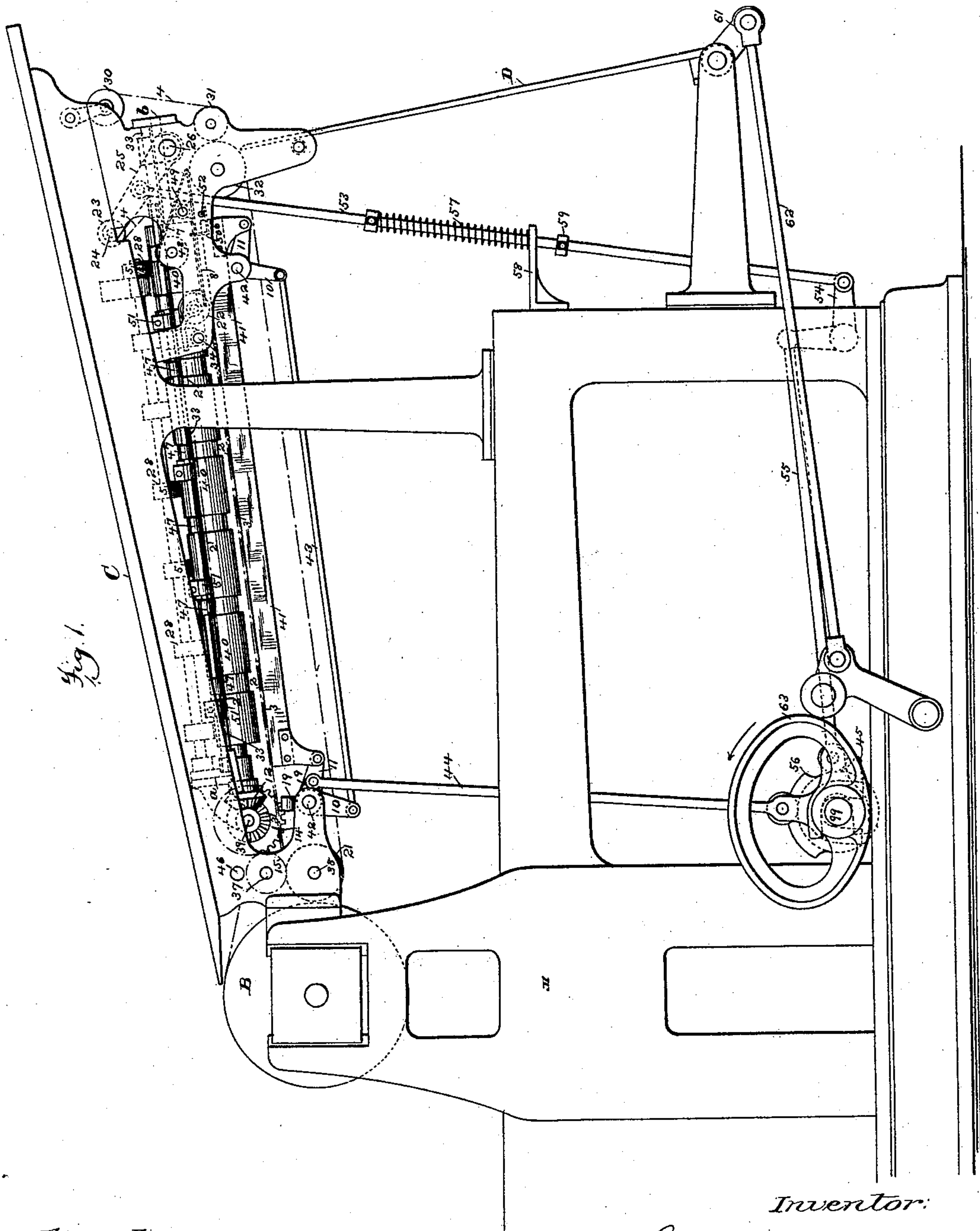


Fig. 1.

Inventor:

Attest

Geo. H. Bott.

J. A. Hovey

Luther C. Crowell
by Munson & Philipp

Atty.

(No Model.)

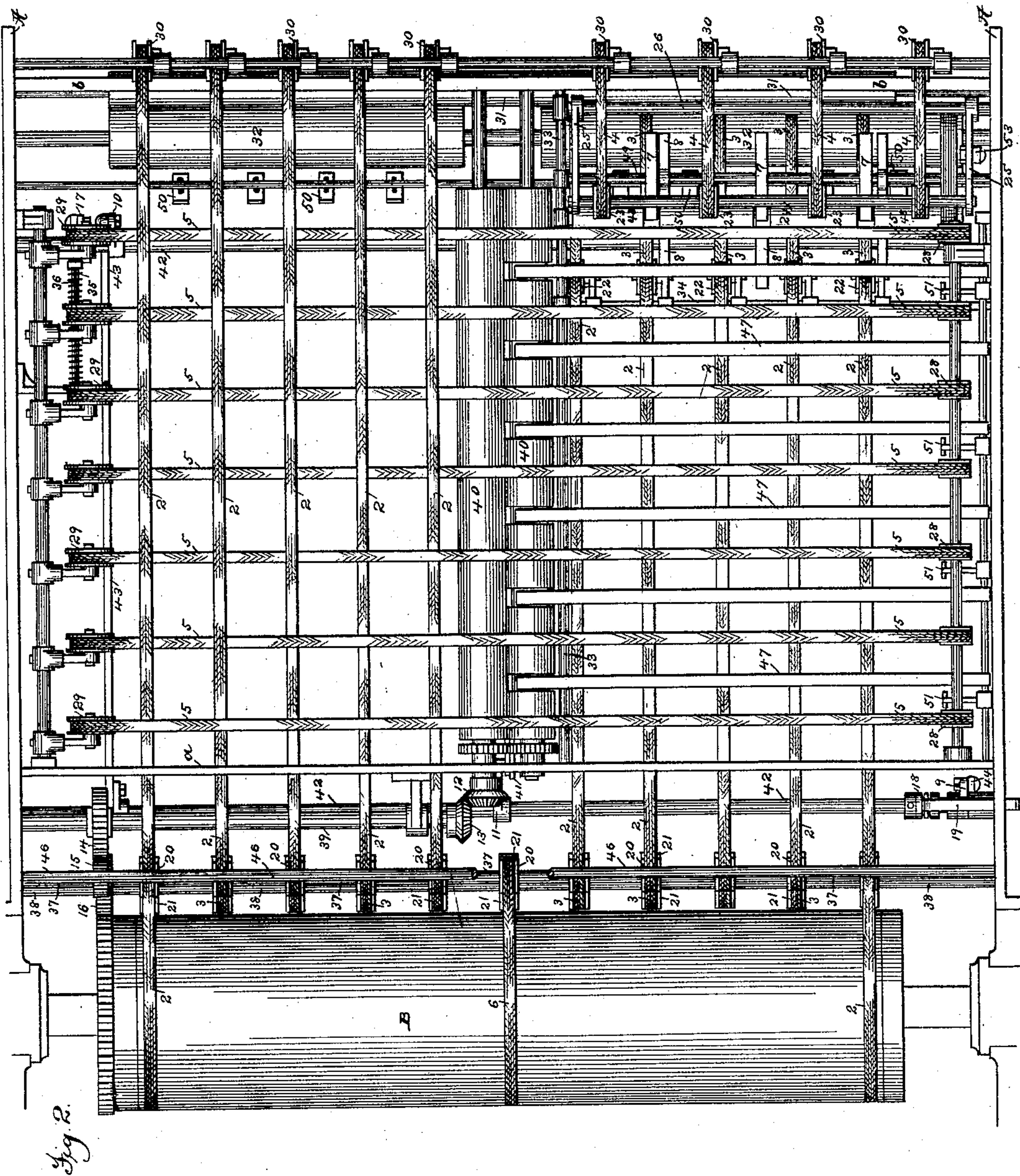
4 Sheets—Sheet 2.

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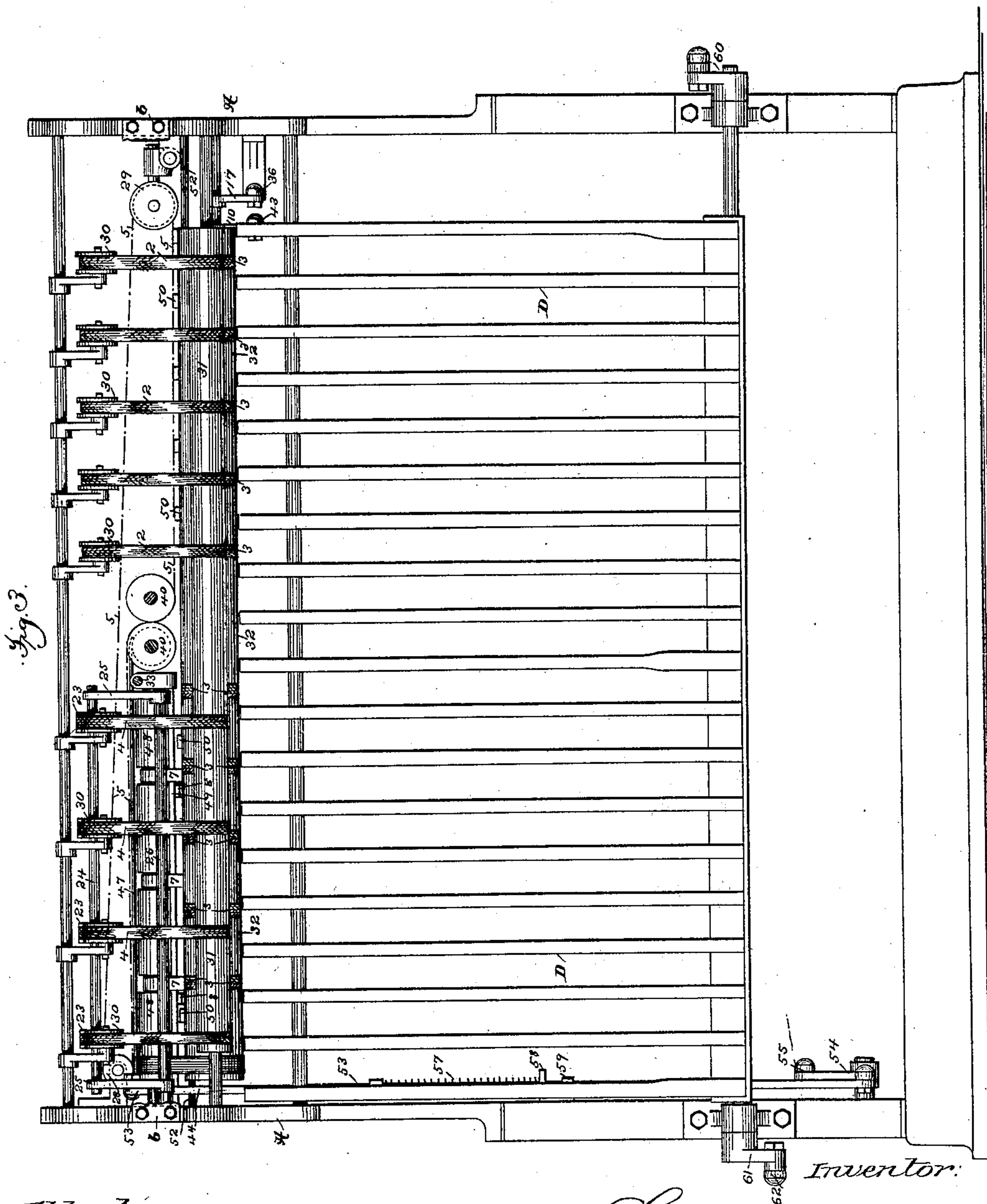
4 Sheets—Sheet 3.

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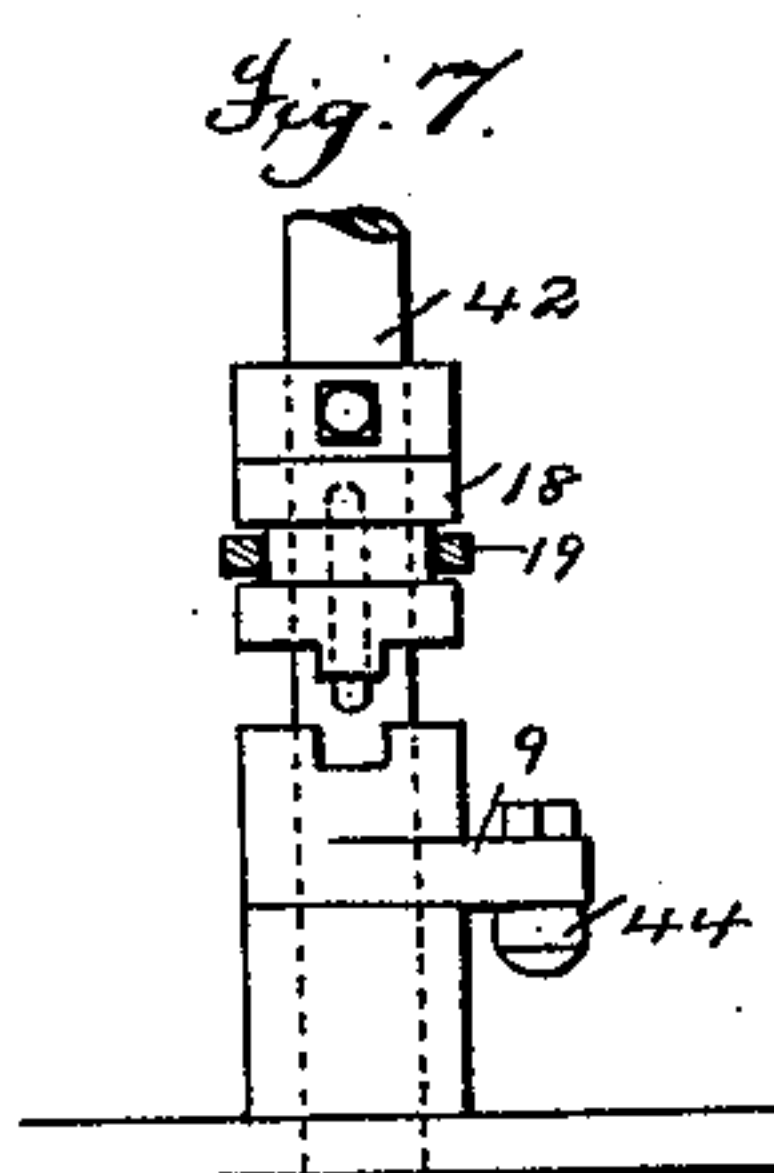
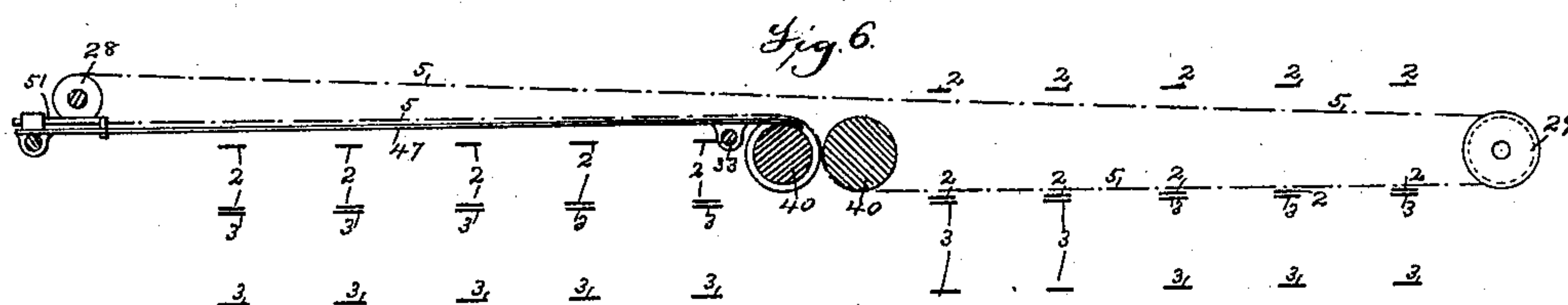
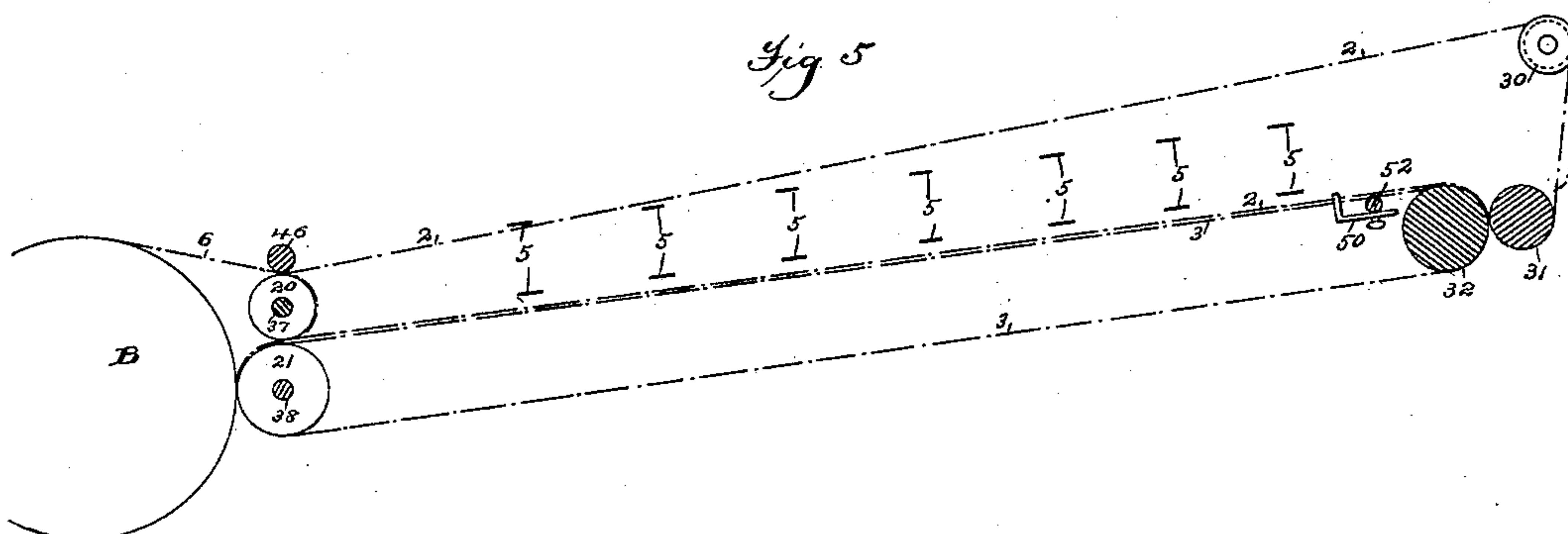
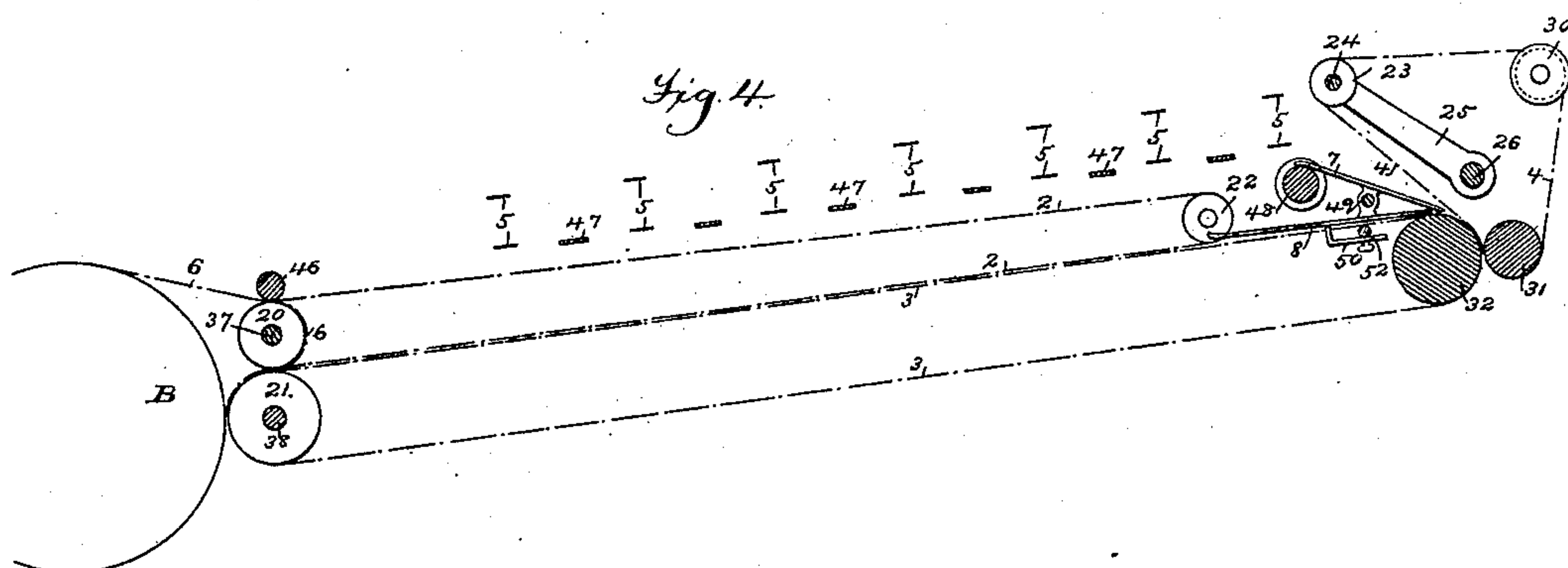
Atty's:

4 Sheets—Sheet 4.

COMBINED PRINTING PRESS AND FOLDING MECHANISM.

No. 486,559.

Patented Nov. 22, 1892.



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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 MECHANISM.

SPECIFICATION forming part of Letters Patent No. 486,559, dated November 22, 1892.

Application filed July 14, 1886. Serial No. 207,975. (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 that class of printing-presses employing a reciprocating type-bed in combination with one or more impression-cylinders and generally known as "cylinder-presses."

The general object of the invention is to provide a combined cylinder-press and folding-machine so constructed and organized that the space above the path of movement of the bed at the delivery end of the machine may be utilized for the folding mechanism and this mechanism brought closely adjacent to the cylinder from which the printed sheet is delivered and by which the sheets delivered from the cylinder shall be folded upward. In cylinder-presses of the common form employing the usual feed board or table I am thus enabled to place the entire folding mechanism in the space under the feed board or table, so that the combined press and folder occupies no more space than that occupied by the press alone.

A further object of the invention is to provide such a combined press and folding mechanism, which shall be capacitated to deliver the sheets either in an unfolded condition or folded with the first fold upward, and, further, to provide such a construction in which the sheets, unfolded or thus folded, may be delivered in all cases by the same fly or other piling mechanism.

A further object of the invention is to provide a folding mechanism operating to fold the sheets upward and so constructed and organized that it can be combined with cylinder-presses already in existence without the necessity of making material alterations in their organization.

It will be understood that my invention is

applicable generally to printing-presses of the class above referred to employing a reciprocating type-bed and one or more impression-cylinders, of which class there are many sub-classes; but for the purpose of illustration my invention will be shown in connection with a single cylinder-press of common form, employing a single impression-cylinder, to which the sheets are fed twice from a feed-board for perfecting, with which construction special advantages are obtained.

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 an end elevation of the same, looking from the right of Figs. 1 and 2, parts being broken away and the feed-board being omitted. Figs. 4, 5, and 6 are diagrammatic views illustrating the arrangement of the tapes by which the sheets are conveyed from the impression-cylinder to the fly; and Fig. 7 is an enlarged detail, which will be hereinafter referred to.

Referring to said drawings, it is to be understood that A represents a portion of the framework, B the impression-cylinder, C the feed-board, and D the fly, of an ordinary cylinder printing-press. The bed of the press, which is not shown, is provided with any of the ordinary connections by which it is reciprocated in the usual manner, and the cylinder B is also driven in any of the common ways so as to rotate in unison with the bed at the time that the impression is taken. The cylinder B is also provided with the usual sheet-grippers (not shown) for holding the sheets to the cylinder during the printing. The feed-board C is arranged in the usual or substantially the usual position above and at one side of the

impression-cylinder, and the fly D is arranged beneath the outer end of the feed-board, as is also usual.

The folding mechanism is located directly
5 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
10 substantially from their usual path of travel. The folding mechanism proper consists of a pair of folding-rolls 40 and a vibrating folding-blade 41, which operates to fold the sheets into the bite of the rolls in the usual manner.
15 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 a transverse shaft 39, having a gear 14, which receives motion from the impression-cylinder through gears 15 16, mounted, respectively, on the shafts 37 38 of the usual delivery pulleys or rolls, which will be hereinafter more particularly referred to. The folding-blade 41 is arranged below 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.
30 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 lowered 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 raise the blade 41 at the proper time to fold each sheet into the bite of the rolls 40. The arm 9 is mounted loosely on the shaft 42, but is arranged to be rigidly connected thereto by means of a sleeve
50 18, (see Fig. 7,) which is splined to the shaft, so as to slide freely thereon and is provided with a tongue which enters a corresponding recess in the hub of the arm 9. The clutch thus formed is provided with an operating-handle 19, which extends outward to the side of the machine and is provided with a fork which rests in a groove in the sleeve 18. From this arrangement it results that by pulling and pushing on the handle 19 the sleeve
60 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 folding-blade 41 into and out of operation. When the arm 9 is not locked to the shaft 42, it will be moved idly by the cam 45, and the blade 41 will be held in its lowered position by means of the spring 35. The handle 19 of the clutch will

be provided with a suitable set-screw, by which the sleeve can be held in either position to which it is moved. The folding mechanism thus organized is provided with four sets of sheet-conducting tapes 2 3 4 5, which operate to take the sheets from the impression-cylinder and convey them either directly to the fly in an unfolded condition or
70 to the folding-rolls 40, and thence to the fly after being folded. These tapes are arranged as follows: The tapes 2 pass between the delivery-pulleys 20 21, which are mounted, respectively, on the shafts 37 38, before referred to, and located in close proximity to the impression-cylinder, as is usual, and thence forward beneath the folding-rolls 40. The tapes of this series, which are upon one side of the rolls 40, pass upward around a series of stretching-pulleys 22, which are mounted on arms extending from a transverse shaft 34, the outer end of which shaft is supported in the side frame and the inner end by a longitudinal rod 33, which extends at the side of one of the rolls 40 from one to the other of the bars *ab*, as best shown in Fig. 2. The tapes of the series 2 upon the other side of the rolls 40 pass forward above a roll 32 and downward partly around said roll and upward around a roll 31
80 and a series of stretching-pulleys 30. From the pulleys 22 30 all of the tapes 2, except the marginal ones, return directly around the pulleys 20. The marginal tapes of this series, however, pass between the outside pulleys of the series 20 and a rod 46 and thence around the ends of the impression-cylinder, returning above the outside pulleys of the series 21. The tapes 3 pass around the pulleys 21, thence forward with the tapes 2 around the roll 32, returning directly from the roll 32 to the pulleys 21. The tapes 4 pass around a series of pulleys 23, mounted upon a shaft 24, which is rigidly secured in the ends of arms 25, extending from a transverse shaft 26, the outer end of which is mounted in the side frame, while its inner end is journaled in a bearing mounted upon the rod 33, thence downward in an inclined direction above the roll 32, and thence upward around the roll 31, returning around stretching-pulleys 30. The tapes 5 pass under one, thence between, and thence above the other of the folding-rolls 40, and outward to the side of the machine, and thence around pulleys 28 and inward, returning around stretching-pulleys 29.
90 100 105 110 115 120

In addition to the tapes already referred to there is provided the usual tape 6, which passes around the middle of the impression-cylinder at the point where the blank space usually occurs between the printed pages of the sheet, thence above the central one of the pulleys 21, and around the corresponding one of the pulleys 20.
125

Located just below the plane of the tapes 5 as they pass outward from the rolls 40 to the side of the machine is a series of stationary guides 47, which are arranged to cooperate with the tapes 5 to convey sheets out-
130

ward to the side of the machine after they have been folded between the rolls 40. Located just below the plane of the tapes 5 and guides 47 is a transverse roll 48, which extends from the side of the machine inward to near the forward ends of the folding-rolls 40, its outer end being journaled in the side frame and its inner end in a bearing supported upon the rod 33. This roll is located in such position as to be directly beneath and co-operate with the pulleys 24 when the latter are vibrated downward, as will hereinafter be explained.

The space between the pulleys 22 and the roll 32 is bridged by stationary guides 8, which are arranged to co-operate with the tapes 3, and the space between the roll 48 and the roll 32 is bridged by similar guides 7, which are arranged to co-operate with the tapes 4. These guides are supported upon a rod 49, the outer end of which is supported in the side frame, while its inner end is supported by the rod 33. The folding mechanism is also provided with two series of adjustable stops 50 51, the former of which are arranged near the ends of the folding-rolls 40 and so as to be interposed in front of the sheets passing forward between the tapes 2 3. These stops are mounted upon a rock-shaft 52, by which means they can be moved out of the path of the sheets when desired. The stops 51 are located near the side of the machine and are interposed in the path of the sheets as they pass outward from the folding-rolls between the tapes 5 and guides 47.

One of the arms 25, which support the shaft on which the pulleys 24 are mounted, is connected to one end of a vertical rod 53, the lower end of which is connected to one arm of a bell-crank lever 54, the opposite arm of which lever is connected to a rod 55, the end of which is bifurcated and straddles the main shaft 99 and is provided with a bowl which is acted upon by a cam 56 upon the main shaft in such manner as to periodically rock the shaft 26 and lower the pulleys 24 into nipping contact with the roll 48. The rod 53 is provided with a spring 57, which is interposed between a collar on the rod and a bracket 58, extending from the frame of the machine and operates to hold the pulleys 24 in their raised position, except when they are moved downward by the cam 56. The rod 53 is also provided with a movable collar 59, having a set-screw by which it can be fastened to the rod in any position, the purpose of which will be presently explained.

The fly D is of substantially the usual construction and is operated to pile the sheets by means of the usual spring, (not shown,) which acts upon the arm 60 of the fly-shaft and is returned to and held in its raised position by means of the usual arm 61, connecting rod 62 and cam 63.

The operation of the mechanism thus organized is as follows: The sheets fed from the feed-board C will be taken by the grippers on the impression-cylinder B and presented to the form to be printed in the usual manner.

After being printed the sheets will be directed off the cylinder by the marginal tapes 2 and the tape 6 and will pass into the control of the tapes 2 3. If it is desired to deliver the sheets in an unfolded condition—as, for example, when they are passed through the press for the first time and are only printed on one side—the shaft 52, carrying the stops 50, will be rocked, so as to take the stops out of the path of the sheets as they pass forward between the tapes 2 3. The sleeve 18 will be shifted so as to release the arm 9 from the shaft 42, and thus render the folding-blade 41 idle, and the pulleys 23 will preferably be rocked downward into nipping contact with the roll 48 and secured in that position by moving the collar 59 up against the under side of the brackets 58 and securing it in that position. The sheets then, as they are taken by the tapes 2 3, will be carried forward between said tapes and beneath the guides 8 and tapes 4 and will emerge from between the rolls 32 31 in front of the fly and be piled in an unfolded condition. If, on the other hand, it is desired to fold the sheets, the stops 50 will be interposed in the path of the sheets, the sleeve 18 will be shifted so as to lock the arm 9 to the shaft 42 and put the folding-blade 41 into operation, and the collar 59 will be moved away from the bracket 58, so as to allow the pulleys 23 to be raised by the spring 57 and depressed by the cam 56. Each sheet will then pass forward between the tapes 2 3 until it arrives at the stops 50. The parts will be so timed that as each sheet is arrested by the stops the folding-blade 41 will be vibrated quickly upward, so as to fold the sheet into the bite of the folding-rolls 40. The sheet thus folded, as it emerges from the rolls 40, will be carried outward above the guides 47 by the tapes 5 until it arrives at the stops 51. It will be observed that the stops 50 are so located that the forward end of each sheet, or what after folding becomes one of its sides, will, as the sheet is carried outward between the tapes 5 and guides 47, project above the roll 48 and beneath the pulleys 23. The parts will be so timed that as soon as each sheet arrives at the stops 51, as just explained, the cam 56 will rock the arms 25 downward and carry the pulleys 23 into biting contact with the roll 48. The side of the sheet, or what now again becomes its leading end, and which, as just explained, projects between the pulleys 23 and roll 48, will thus be taken by the roll 48 and the tapes 4 and carried forward between the tapes 4 and guides 7, and will thence pass between the rolls 31 32 and emerge in front of the fly and be piled in a once-folded condition.

It may sometimes be desirable when the sheets are being delivered in an unfolded condition to render the folding-rolls 40 idle. If it should be desired to do this, it can readily be done by arranging either one of the gears 12, 13, or 14, so that it can be disconnected

from its shaft, or so that it can be shifted out of engagement with its companion gear when desired.

Although it will usually be most desirable to have the rolls 40 arranged at right angles to the impression-cylinder, as shown, they may be arranged parallel with the cylinder, if preferred, or if in any particular case it is found best to have them so arranged.

It will be seen from the foregoing that the combined printing and folding mechanism 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. 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 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 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 that the sheets will be delivered in a folded condition. There are cases, however, in which it is desirable that the sheets should be folded as 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 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 is frequently desirable that the sheets should be folded once before being shipped to the small offices. Such folding not only reduces the sheets to more convenient dimensions for shipment, but makes it possible to print the remaining side of the sheets upon 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 should be so done that the side first printed will be upon the inside of the folded sheet. It will readily be seen that if the folding-rolls 40 were located below and the blade 41 above the path of the sheets as they pass from the impression-cylinder between the tapes 2 3 this would not be accomplished, as in such case the printed side or the side last printed, as the case might be, would be next to the folding-rolls at the time of folding, and would consequently be upon the outside after the sheet was folded. By arranging the rolls 40 above and the blade 41 be-

low the path of the sheet, however, the printed side of the sheet or the side last printed is brought next to the folding-blade, and is consequently upon the inside of the sheet after folding.

By means of the organization herein shown and described a combined cylinder-press and folding mechanism of the class shown is provided, which occupies no more room than that occupied by the press alone, in which the folding mechanism is located entirely beneath the feed-board of the press so as to be covered and protected, and by which the sheets can be delivered either in an unfolded or folded condition to the same fly, which fly is located in the usual position and without substantial departure from the path of travel which they ordinarily take in those machines which are not provided with a folding mechanism in passing from the impression-cylinder to the fly. It will be understood, however, that my invention is applicable, also, to other classes of cylinder-presses not employing a feed-board, and that while it is preferable that my special folding mechanism delivering folded sheets at the same point as unfolded be used for convenience and economy of floor-space, and such a construction forms a part of my invention, this feature is not absolutely essential and my invention is not to be limited thereto. It will be understood, also, that my invention is not to be limited to a construction capacitated to deliver the sheets folded or unfolded, as it may be embodied in a construction delivering only folded sheets.

It will be observed that the folding mechanism shown is so arranged that it may be combined with an ordinary cylinder-press without the necessity of making any substantial change in the general construction of the latter, thereby making it practicable to combine this folding mechanism with presses already in existence at a comparatively-small outlay, and this construction forms a part of my invention, although it will be understood that this feature is not essential to my invention, broadly considered. It will also be observed that the folding mechanism may be so combined with the printing mechanism that the principal parts of the delivery apparatus found in the ordinary cylinder-press remain practically unchanged and can be readily utilized. Thus the delivery-pulleys 20 21, the tapes 2 3, and the rolls 31 32 are found in and are arranged in the same or substantially the same relation to each other in ordinary cylinder-presses that they are in the present case. The broad subject-matter of the combinations illustrated in the present case is claimed in my application, No. 207,209, above referred to, the present invention being limited to the specific subject-matter of combinations in which the first fold of the sheets is upward. It is also to be understood that the folding-rolls 40, instead of being arranged at right angles to the impression-cylinder, so that the sheet will be folded longitudinally—that is to

say, in the direction of its travel through the machine—may, if in any case it should be found desirable, be arranged parallel with the impression-cylinder, so that the sheet will be folded transversely, as shown in my application for Letters Patent filed July 6, 1886, Serial No. 207,209.

What I claim is—

1. The combination, with a printing-press having a reciprocating type-bed coacting with an impression-cylinder, of mechanism for conveying the sheets from the cylinder and a folding mechanism located adjacent to the cylinder and above the path of the bed and arranged to fold the sheets upward from said conveying mechanism, substantially as described.

2. The combination, with a printing-press having a reciprocating type-bed coacting with an impression-cylinder, of a folding mechanism located adjacent to the cylinder and above the path of the bed and arranged to fold the sheets upward, said folding mechanism being constructed to be rendered inoperative, and means for delivering the sheets unfolded, substantially as described.

3. The combination, with a printing-press having a reciprocating type-bed coacting with an impression-cylinder, of a fly located at the end of the press and a folding mechanism located adjacent to the cylinder and above the path of the bed and arranged to fold the sheets upward and deliver them to the fly, substantially as described.

4. The combination, with a printing-press having a reciprocating type-bed coacting with an impression-cylinder, of a fly, tapes for conveying sheets from the cylinder to the fly in an unfolded condition, and a folding mechanism constructed to be rendered inoperative and arranged to fold the sheets upward from said tapes, substantially as described.

5. The combination, with a printing-press having a reciprocating type-bed coacting with an impression-cylinder, of a fly, tapes for conveying sheets from the cylinder to the fly in an unfolded condition, and a folding mechanism constructed to be rendered inoperative and arranged to fold the sheets upward from said tapes and deliver them to the fly in a folded condition, substantially as described.

6. The combination, with a cylinder printing-press and its feed-board, of a folding mechanism located adjacent to the cylinder

and beneath the feed-board and arranged to fold the sheets upward, substantially as described.

7. The combination, with a cylinder printing-press, its feed-board, and tapes for conveying the sheets from the impression-cylinder outward beneath the feed-board, of a folding mechanism located adjacent to the cylinder and beneath the feed-board and arranged to fold the sheets upward from said tapes, substantially as described.

8. The combination, with a cylinder printing-press, its feed-board, and tapes for conveying the sheets from the impression-cylinder outward beneath the feed-board, of a pair of folding-rolls located adjacent to the cylinder and above the path of the sheets and a folding-blade located beneath the path of the sheets and arranged to fold the sheets upward into the bite of the rolls, substantially as described.

9. The combination, with the impression-cylinder, the fly, and the tapes arranged to convey the sheets from the cylinder to the fly in an unfolded condition, of the folding-rolls located above the path of the sheets, and the folding-blade, capable of being rendered inoperative, located below the path of the sheets and arranged to fold the sheets upward into the bite of the rolls, substantially as described.

10. The combination, with the impression-cylinder and the tapes for conveying the sheets from the cylinder, of the folding-rolls arranged above the path of the sheets, the folding-blade arranged below the path of the sheets, the tapes, and the vibrating pulleys and tapes, substantially as described.

11. The combination, with the impression-cylinder, the fly, and the tapes for conveying the sheets from the cylinder to the fly in an unfolded condition, of the folding-rolls arranged above the path of the sheets, the folding-blade arranged below the path of the sheets, the tapes, and the vibrating pulleys and tapes, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

J. A. HOVEY,
T. H. PALMER.