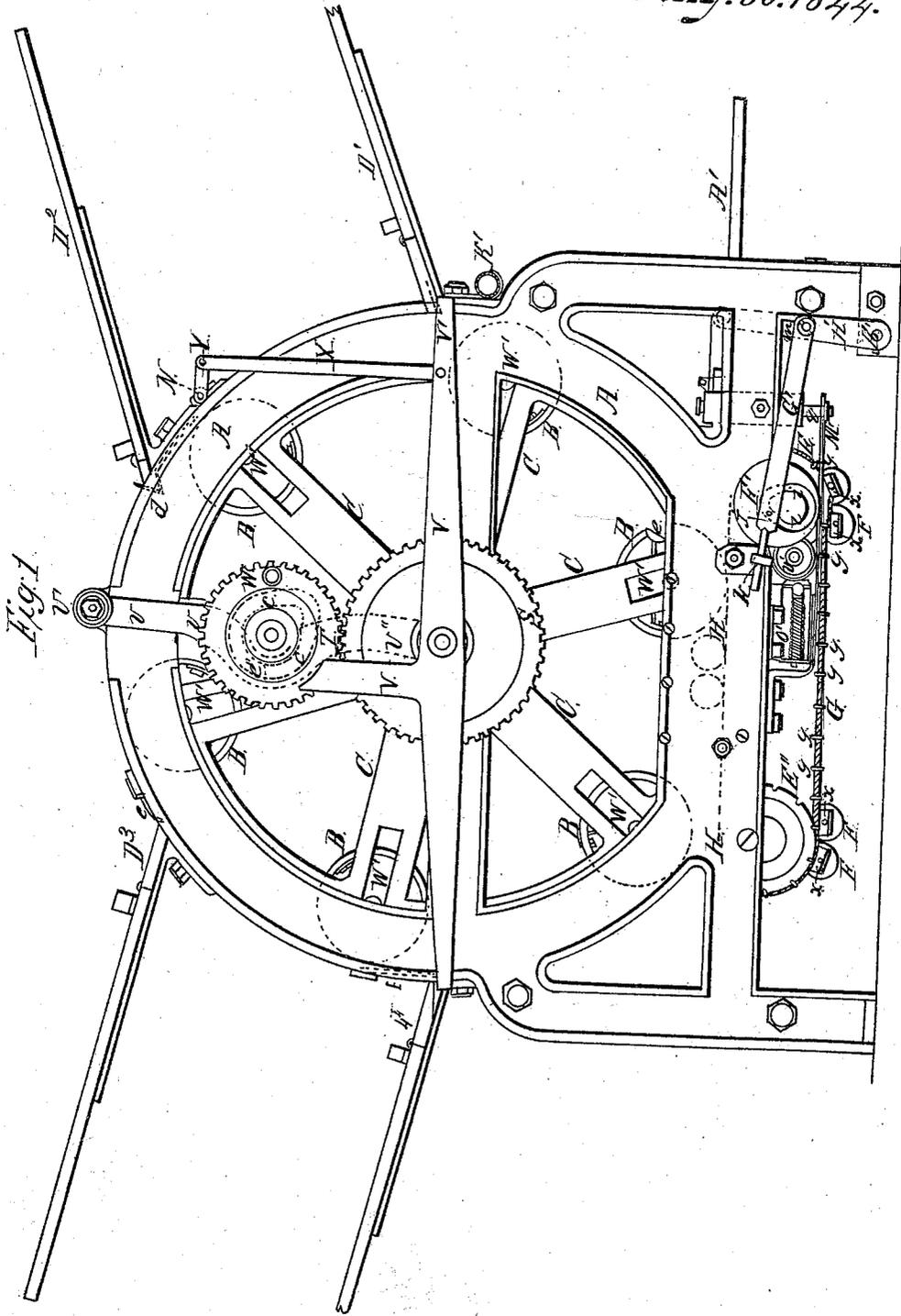


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Patented July 30, 1844.

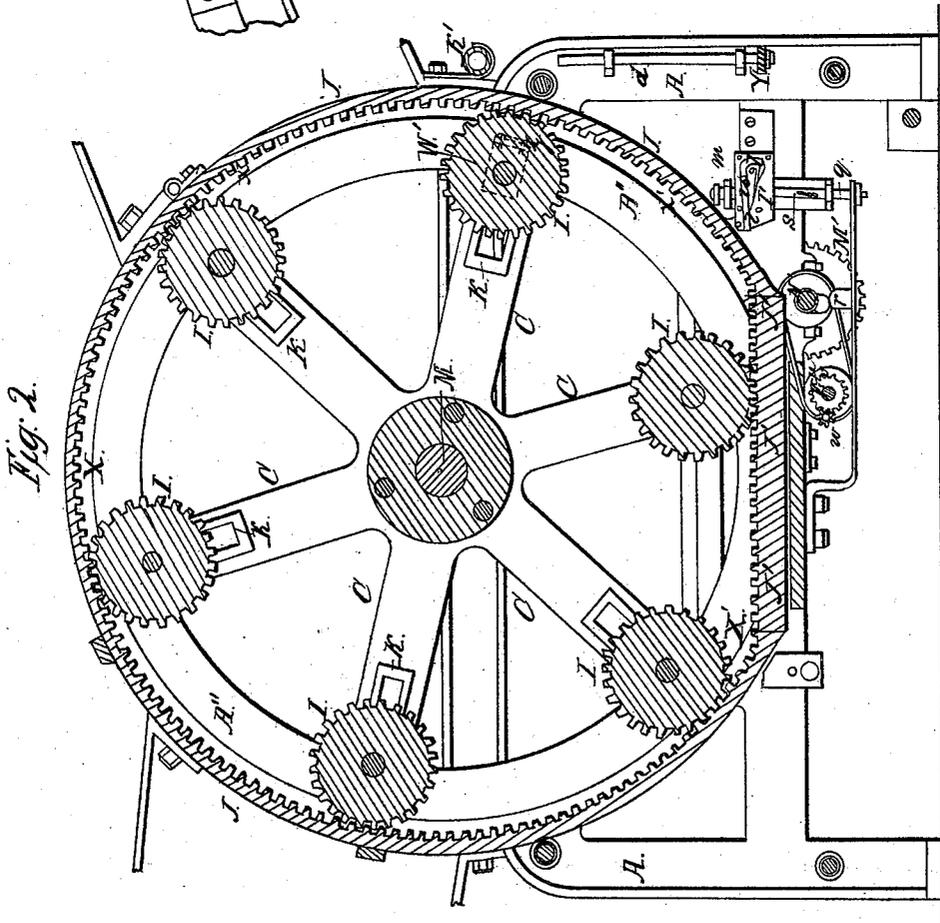
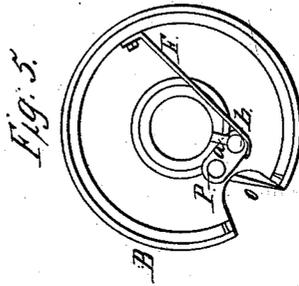
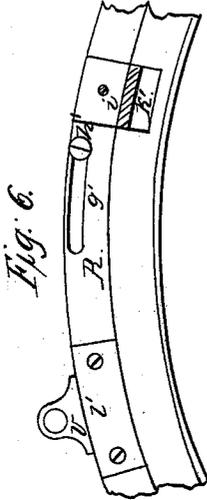


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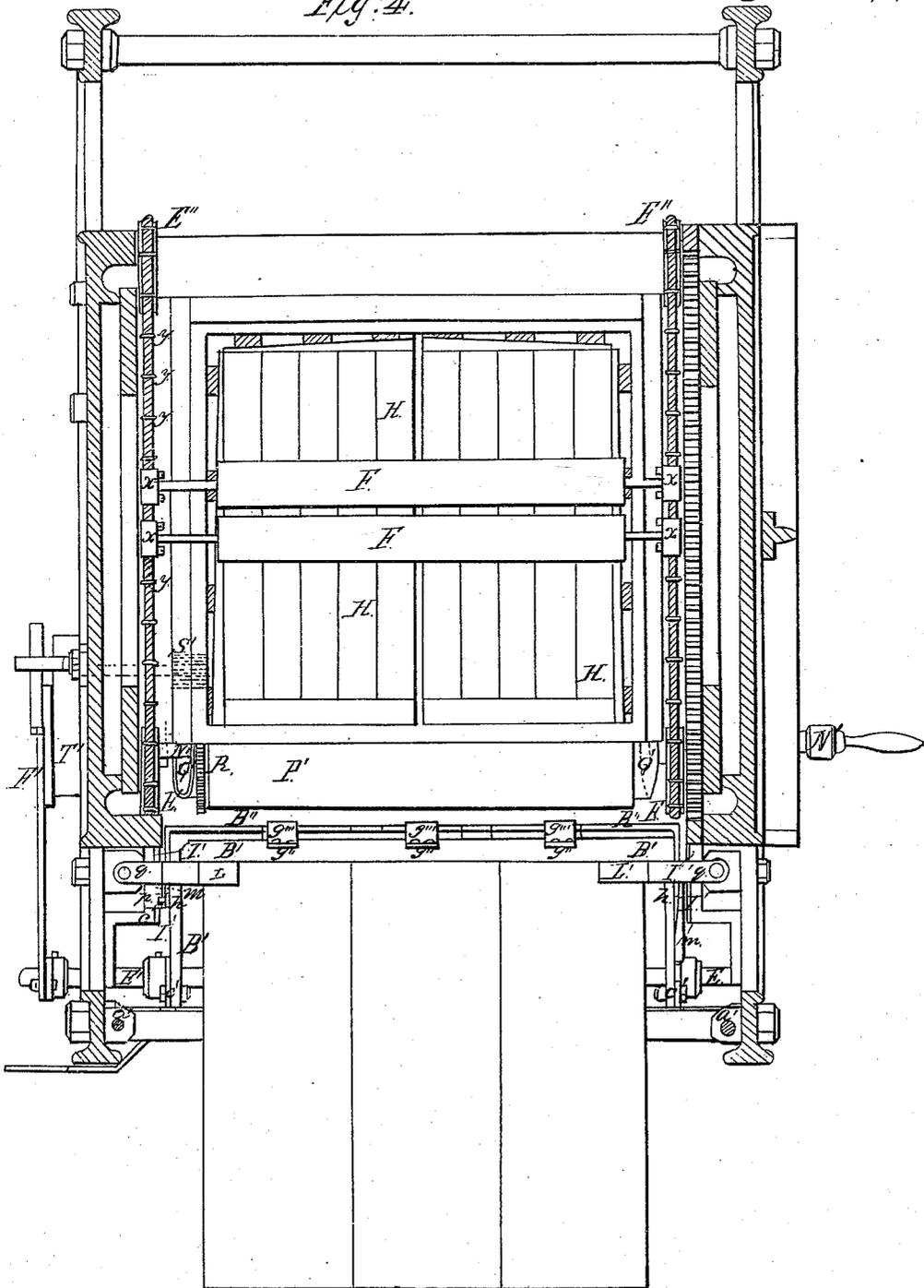


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Fig: 4.



UNITED STATES PATENT OFFICE.

RICHARD M. HOE, OF NEW YORK, N. Y.

IMPROVEMENT IN PRINTING - PRESSES.

Specification forming part of Letters Patent No. 3,687, dated July 30, 1844.

To all whom it may concern:

Be it known that I, RICHARD M. HOE, of the city of New York, in the State of New York, have invented a new and useful Rotary Combined Cylinder Printing-Press, which I denominate the "Planetarium Printing-Press;" and I do hereby declare that the following is a full and exact description thereof.

The distinguishing feature of this press is its being provided with a number of cylinders—say from two to six or eight, or more—each of which is to receive a sheet of paper that is to be carried by it to the form of type to receive an impression. The whole of these cylinders are to be carried round by the continuous motion in one direction of an axis which is their common center of motion; or the cylinders may be attached to one or two chains or bands in a manner similar to that of the inking-rollers, as hereinafter described, the form of type remaining at rest during the whole operation, so that the reciprocating action of a platen or bed or of any other part having considerable momentum is avoided.

The respective figures which represent my press in the accompanying drawings are drawn to a scale of three inches to the foot for a press of six cylinders.

Figure 1 is a side elevation of my press. A A is the frame, B B are the cylinders, and C C the arms which carry them round. D', D², D³, and D⁴ are the feed-boards. This press is represented as having six cylinders; but this number may be varied without altering the general construction. E E'' are pulleys which carry the inking-rollers F F by means of a band G. The dotted line H shows the place of the face of the form of type, which is to be laid on a suitable bed.

Fig. 2 is a vertical section through the main body of the machine at that end where the cylinders are geared by toothed wheels I to a toothed rim J J, that is attached to the inside of the frame. The lower part J' J' of this toothed rim is straight and is that which carries the cylinders directly over the form. There are slots K K in the arms C C, which admit of the sliding of the cylinders, so as to allow them to pass horizontally over the form. Should it be preferred, the type may be so cast and set up as that the face of the form shall be curved to such extent as to adapt it to the circle in which the outsides of the cyl-

inders revolve, in which case the toothed rim J J may be a perfect circle.

Fig. 3 is an elevation of the machine at that end of it where the printed sheets are delivered onto the fly-board. L is a pinion on the main driving-shaft, through which the motive power may be communicated to the main shaft M of the machine through the intermedium of the main wheel N on the end of said shaft.

Fig. 4 is a horizontal section of the machine on the level of the upper sides of the inking-rollers F F as they pass over the form.

The sheets to be printed are laid onto the feeding-boards in the usual manner, and as there are four of them there will be three cylinders pass each board after a sheet has been taken from it before another sheet is taken hold of by the fingers with which each cylinder is provided for that purpose. O O are the fingers which are fixed on a shaft P, as usual in cylinder-presses; but these shafts are governed in their motions without the employment of toothed pinions, they being actuated in the following manner: In Fig. 3 *a* is a short lever that is made fast on the end of the shaft P, and *b* is a stud made fast to the outer end of the lever *a*. In the position in which this part is shown in the figure the fingers are just ready to open for the purpose of delivering the sheets onto the fly-board A', on which they are received.

The sliding boxes W', that receive the gudgeons of the cylinders, are guided in their course by a stud *z*, (shown in dotted lines in Fig. 2,) which is received within a groove X' on the inner part A'' of the rim of the frame. This groove has a horizontal direction at its lower side, where the cylinders pass over the form. The stud *z* may be adjusted so as to regulate the pressure of the cylinders on the form by the aid of binding and set screws operating in the ordinary way.

The manner in which the fingers are opened for the purpose of delivering the sheets will be readily understood after describing the form and action of the cam or guide-pieces, by which they are moved in taking hold of the sheet, the cam or guide-pieces being similar in each case.

The taking hold of the sheets laid upon the feeding-boards is managed in the following manner: R, Fig. 3, is a flat ring a little ex-

ceeding a semicircle, so that its ends just reach below the lower feeding-boards $D^1 D^4$. This ring has cams or guide-pieces on its face which act on the stud b , and consequently on the fingers. The ring R rotates to a short distance back and forth, so as to carry the cams on its face into the proper position to act on the respective studs b and to cause the fingers to lay hold on the sheets, and when this has been effected the ring rotates so far back as to carry the said cams out of the way of the studs on the cylinders, while said cylinders are carrying the sheets round toward the form of type. The toothed wheel S , Fig. 1, is fixed on the main cylinder-shaft and revolves with it. This wheel gears into the wheel T , which is two-thirds the diameter of S . On the interior face of the wheel T there is a groove, (shown in dotted lines at $c c$,) which receives a pin c'' (shown also in dotted lines) on a lever U , attached at its upper end U' to the ring R and working on a fulcrum at its lower end U'' . When this lever is moved, it carries the ring R back and forth at the proper time for causing the fingers to take hold of the sheet and for removing the cams or guide-pieces out of the way after this has been effected.

In Fig. 5 I have given an end view of one of the cylinders, showing the lever a on the end of the shaft P of the fingers and the stud b at the outer end of said lever. A part of one of the fingers o is likewise represented in its position when holding the sheet. A spring f bears on the stud b and serves to hold the fingers in their proper position, whether opened or closed.

Fig. 6 is a segment of the interior of the ring R , l' being the part to which the lever U is attached. This ring has several slots g' and guide-screws h' to allow of its rotating to the required distance. i' is one of the cams or guide-pieces on which $j' j'$ are projections, and k' is a recess through which the stud b may pass. By coming in contact with the guide-piece it will be seen that the proper action of the fingers will readily be obtained.

The general arrangement and management of the fingers are the same at all the feeding-boards; but there are slight variations to adapt each to its particular position. The inner end of the board D^1 is hinged so as to allow it to rise to a distance sufficient to lift the sheet to be taken off by the fingers to a height sufficient to clear the stop guides or pieces which stop the sheets at the inner edge of this board. The inner end of the board is lifted in the following manner: V is a lever which is acted upon by the friction-stud W on the wheel T , and the end V' of this lever raises the end of the board D^1 at the moment when the sheet is seized by the fingers. From the lever V rises a rod X , which is attached by a joint-pin to a connecting-piece Y on the end Z of a shaft to which the stop-guides of the board D^2 are attached. These stop-guides are shown at $d d$, Fig. 3. By

the action of the rod X said guides are depressed, and the same end is attained in feeding on the board D^2 as by raising D^1 . The position of the board D^3 as related to the cylinders does not require any movement of the stop-guides or of the board, as the guides are suspended from above, as shown by the dotted line e , and the sheet is merely drawn down. The stop-guides of the board D^4 are also suspended from above, as shown at f , and the inner end of this board drops by the descent of the end of the lever V that sustains it, and the sheet is drawn off without being interfered with by the stops.

When the cylinders arrive at the straight part $J' J'$ of the rim $J J$, they are carried horizontally over the form of type which lies stationary on its bed, and the impression is made as in other cylinder-presses, and the sheets delivered onto the fly-board A' . The arrangement of the parts concerned in the delivery is as follows: In Figs. 3 and 4, $g'' g''$ are the clasps which take hold of the sheet as the fingers open and release it. These clasps are attached to the bars $B' B' B'' B''$, their lower halves g'' being attached to the bar B' and their upper halves to the bar B'' . These bars are united by joint-pins at $h h$. The bars $B' B''$ are carried back and forth by the arm C' , attached to the shaft E' . This shaft is made to vibrate in the following manner: F' , Figs. 1, 3, and 4, is a disk or wheel on the main driving-shaft N' , and this operates as a cam by having a groove $i i$ in it that receives a pin j , (shown in dotted lines on the piece G' ,) that slides through a stud at k , Fig. 1. The other end of this piece carries the arm H' , that vibrates the rod E' , giving to the lever C' its proper motion by the peculiar form of the groove $i i$. On each side of the frame there is a guide-piece I' , having a groove $l l$ sunk in it, in which groove a pin m , attached to the bar B' , is received, and serves to guide said bar back and forth in the proper course. A spring m' bears upon one of these pins. In the guide-pieces I' , the face of one of which is seen in Fig. 2, the piece n is jointed and borne down by a small spring. This piece when closed makes a clear bearing for the pin m as it moves back and allows it to rise freely on its return inward. There is a pin o on the bar B'' which opens the clasp. This pin, on the return of the bars $B' B''$ inward, passes under a projecting piece p on the frame, which, depressing the pin o , opens the clasp at the proper time for it to receive the sheet from the fingers. This action of the clasp is similar to that in some other cylinder-presses, but the arrangement described for moving and governing them is adapted to this particular machine. The lower edge of the printed sheet is brought over the inner end of the fly-board A' by the moving back of the clasp, and as the cylinders revolve the sheets fall over upon the fly-board. To insure their doing so with certainty, a wind-tube $K' K'$, Fig. 3, is used, and a current of

air being made to pass through this tube upon the inner side of the sheet the desired end is thereby attained, the wind passing out through lateral openings on the descending ends K'' K'' of this tube, into which air may be blown by bellows or otherwise.

As the sheets are laid upon the fly-board they are held in place at each end by means of a foot L' , and when a fresh sheet is laid upon the board these feet are turned back, raised, and brought forward and down again by the devices now to be explained. q q is a cylindrical rod, upon the upper end of which the foot L' is formed. M' , Fig. 2, is a spring that forces the rod q q up. r is a piece of metal attached to the spring M' , the upper end of which bears against a cam on the main driving-shaft N' . To cause the feet to turn in the proper direction in leaving the pile and in returning to press upon the last sheet, a curved groove (shown by the dotted lines at s) is made in the rod q q , and the end of a screw or pin passing into this groove causes it to revolve, it being left free to do so on the spring M' . A like apparatus is placed on each side of the machine. To cause the fingers to let go the sheet at the proper time, there is a permanent cam or guide-piece on the inner side of the frame, which is similar in construction in all respects to those on the ring R .

As sheets are deposited and accumulate on the fly-board A' it is necessary that said board should be allowed to descend, which it is made to do in proportion to the height or weight of the accumulated impressions. Y Y' are sliding rods which pass through studs a' a' and sustain the fly-board at their lower ends and serve to guide it up and down. Z' , Fig. 3, is a rack which is attached at its upper end to the fly-board and gears into a pinion on the shaft of the ratchet-wheel b' . On the back of this ratchet-wheel there is a grooved pulley admitting of its being acted upon by a weight hung by the cord c' , which weight will be drawn up as the fly-board descends by the accumulation of the load upon it. d' is a lever to raise the pawl e' when requisite.

The ink trough or fountain O' is similar to that in general use on the improved double-cylinder press, excepting in one point, to be presently described. P' is the distributing-roller, which is loose upon the main driving-shaft and is made to turn in a direction the reverse of that shaft by a gearing hereinafter explained. The distributing-roller P' has a reciprocating motion given to it endwise by means of the oblique-faced rims Q' Q' at its two ends, which are reversed in direction and bear at their edges on the friction-rollers t t .

The distributing-roller is made to revolve by a pinion gearing into the toothed wheel R' at its end, which pinion is shown in dotted lines at S' . A belt T' embraces a whirl on the main driving-shaft, and also a whirl on the shaft of the pinion S' . (Seen at U' , Fig. 1.) The teeth of the pinion S' are of sufficient

length to allow of the traversing of the distributing-roller P' endwise.

The fountain-roller of the inking apparatus is on the shaft V' . To this roller it is desirable to give a very slow motion, and this I effect by means of differential gearing in the following manner: The whirl u is driven by a band embracing a whirl on the driving-shaft N' . The toothed wheel v is made fast upon the shaft V' of the fountain-roller, and there is a stationary wheel concentric with it on the other side of the whirl u , which wheel is made fast to the frame of the machine; but the number of teeth in these two wheels differs, say, by one. A pinion w is connected by a common shaft to a corresponding pinion on the other side of the whirl and gears into the stationary wheel, while that marked w gears into the wheel v on the shaft of the fountain-roller. It will readily be seen by those acquainted with mechanics that a motion as slow as may be desired may be thus communicated to the fountain-roller. This result may, however, be attained in other ways, but the foregoing plan I have used and found it to work well.

The inking-rollers F are attached to a band G by means of boxes x , which receive the gudgeons of the roller. The band G is driven, as shown in the drawings, by a whirl E on the driving-shaft and passes round a second whirl E'' . The inking-rollers F F are by this arrangement carried under the bed of the form and receive the ink and have it distributed upon them, as in other cylinder-machines, by means of the distributing-roller P' . A pair of these inking-rollers pass over the form between each pair of cylinders. The whirls E E'' are represented as notched to receive rings y y , which surround the band G , and thus prevent its slipping.

Having thus fully described the nature and operation of my improved rotary printing-press, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The constructing of a press furnished with a series of cylinders—say six, eight, or any other number more or less which may be preferred—which cylinders are provided with fingers for laying hold on the sheets and are carried round by a continuous rotary motion in the same direction; they are also to be so arranged as that when they arrive at the form of type they shall be carried over it in a horizontal direction, substantially as hereinafter described.

2. The manner in which I have arranged and combined the inking apparatus by attaching the boxes in which the gudgeons of said rollers run to bands at each of their ends and carrying them under and over the form and in contact with the distributing-roller, the whole apparatus being governed and operating as set forth.

3. The manner of governing the fingers in closing them upon the sheets by the action of the sliding ring and the cams or guides there-

on, which operate on studs on the finger-shafts, the motion of the sliding ring and the other motions necessary to this action being effected substantially as described.

4. The manner of governing the sliding boxes on the arms of the cylinders by means of the guide-groove X' and the adjustable stud z, or by any other arrangement of the parts concerned therein, by which the same end is attained by equivalent means.

5. The manner of arranging the parts connected with the clasps for taking the sheets from the cylinders and depositing them on the fly-board, said parts consisting of the bars B' B'', the vibrating shaft E', the guide-pieces I', and their appendages by which the clasp-bars are opened and closed and made to vibrate in and out, for the purpose and in the manner described.

6. The manner in which I govern the action

of the feet L' L', causing them to perform the respective motions herein described, the parts principally concerned in said motions being the cylindrical rods q q, the curved grooves s in them, the spring M', and their appendages co-operating with each other, substantially as set forth.

I do hereby declare that I do not intend by the descriptions herein given to limit myself to the precise form or arrangement of the respective parts, but to vary these as I may find convenient, while I do not depart from the principles upon which my improvements are dependent, but attain the same ends by means substantially the same.

RICHD. M. HOE.

Witnesses:

JOHN COLBY,
S. T. SMITH.