

(No Model.)

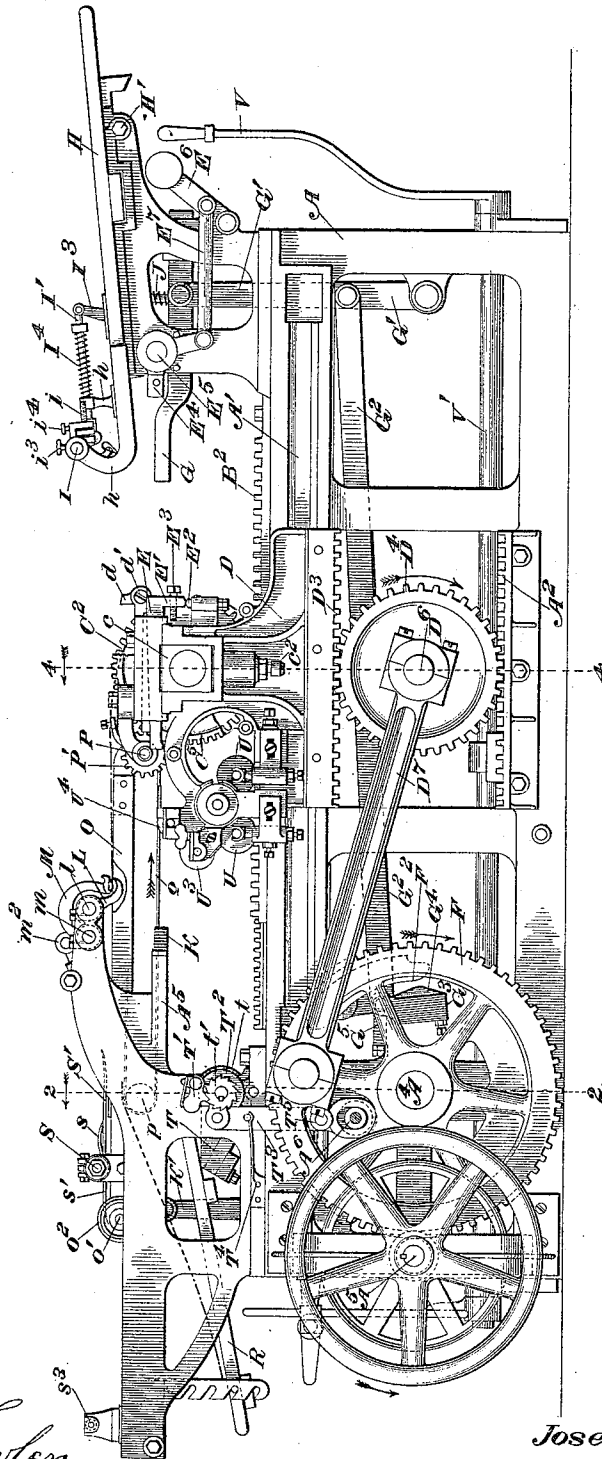
8 Sheets—Sheet 1.

J. L. COX.
SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.

Fig. 1.



Witnesses:

M. E. Fowler
Geo. Bausfield

Inventor:

Joseph L. Cox

By his Attorneys:

Alexander & Lowell

(No Model.)

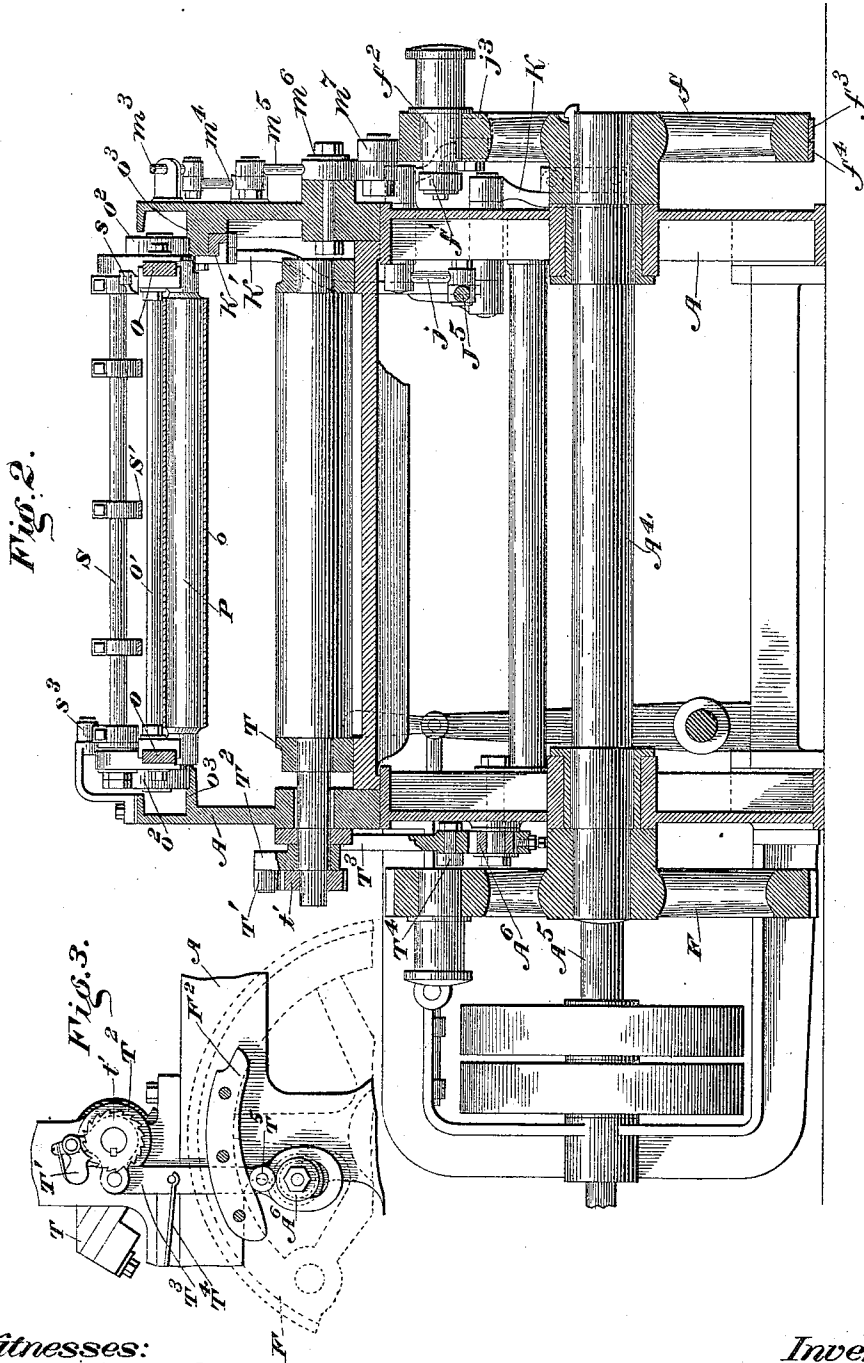
8 Sheets—Sheet 2.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:

M. C. Fowler
Geo. R. Mausfield

Inventor:

Joseph L. Cox

By his Attorneys: *Alexander & Dowell*

(No Model.)

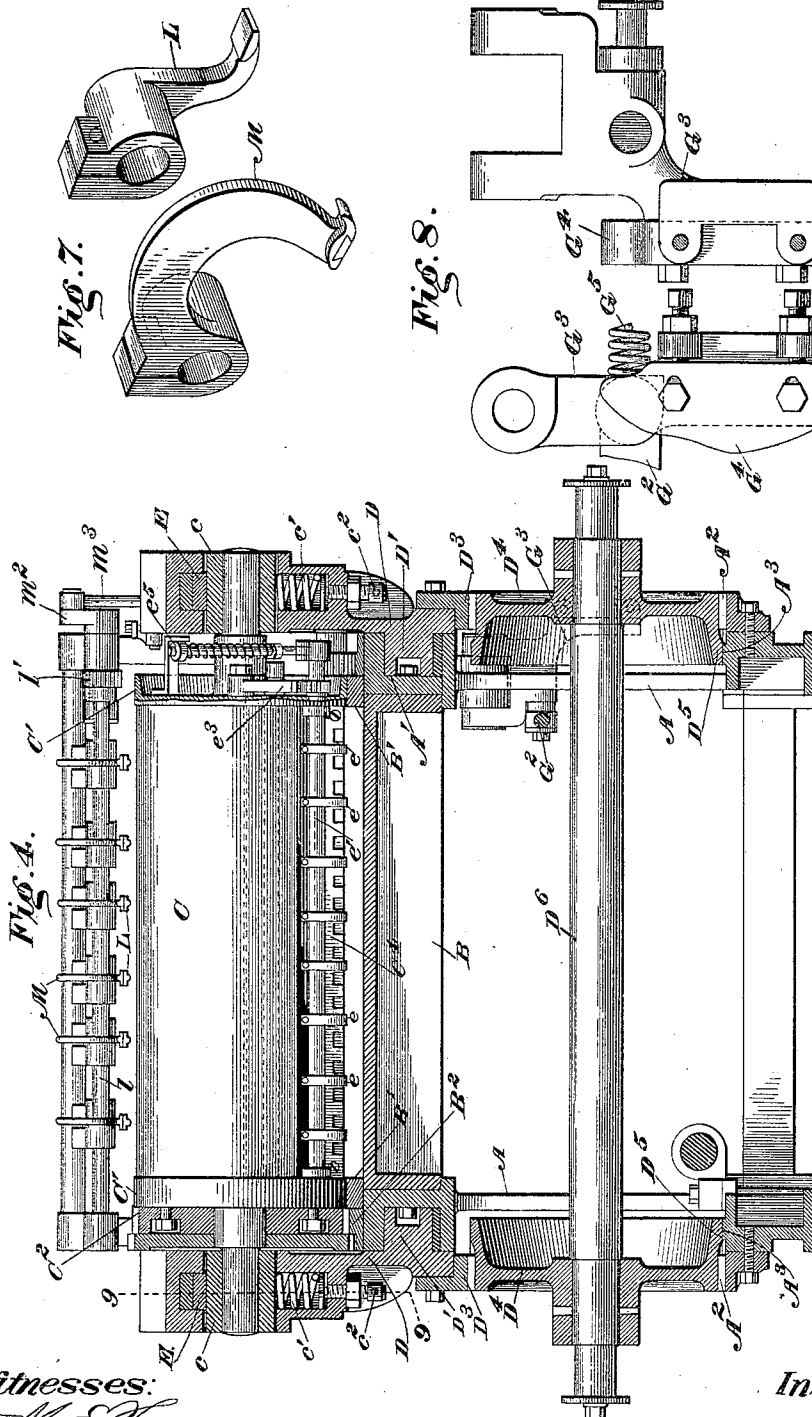
8 Sheets—Sheet 3.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:
M. E. Fowler
Jas. Mansfield.
By his Attorneys: *Alexander F. Sowell*

Inventor:
Joseph L. Cox

(No Model.)

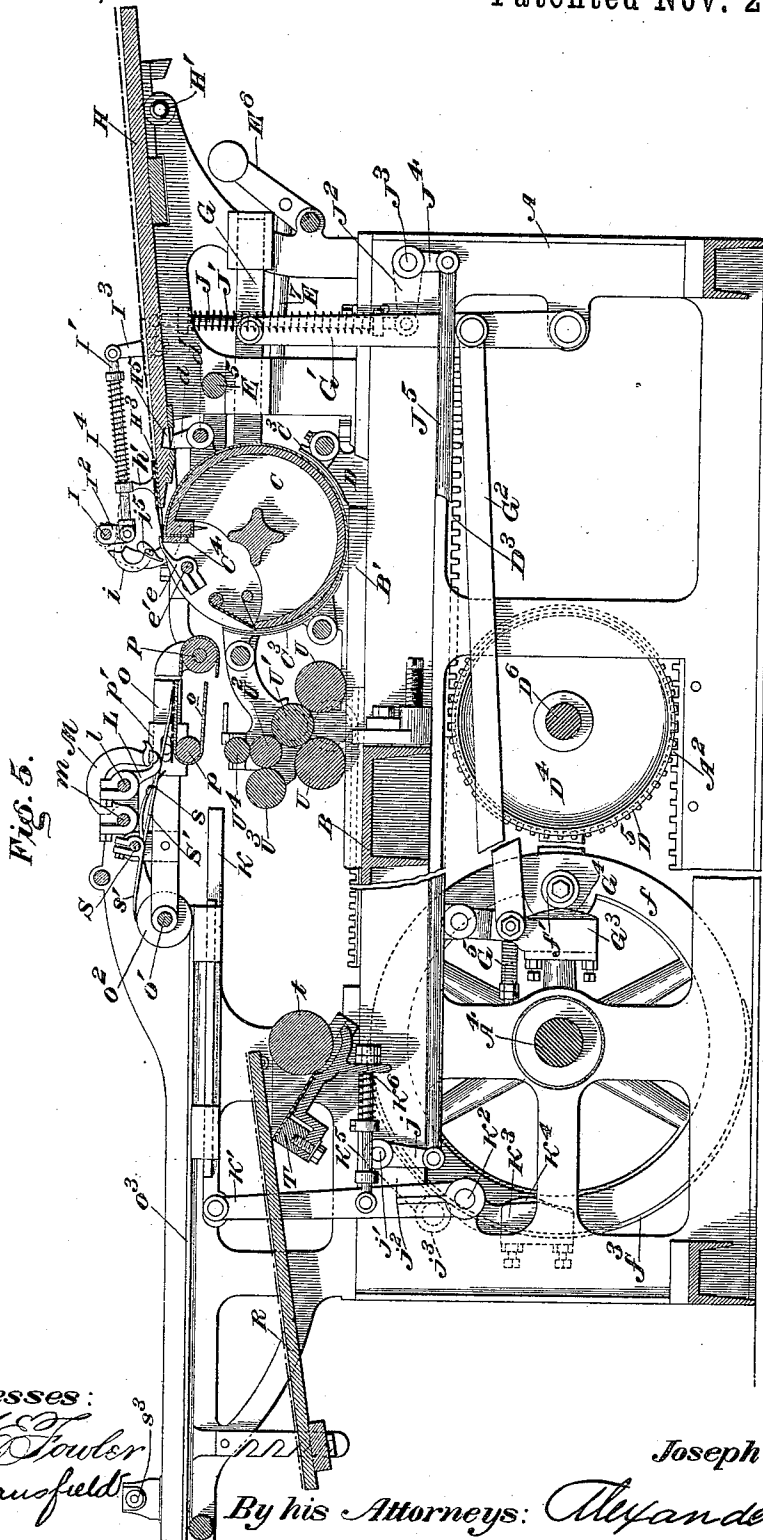
8 Sheets—Sheet 4.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:

M. C. Fowler
J. B. Mansfield

Inventor:

Joseph L. Cox

By his Attorneys: *Alexander & Dowell*

(No Model.)

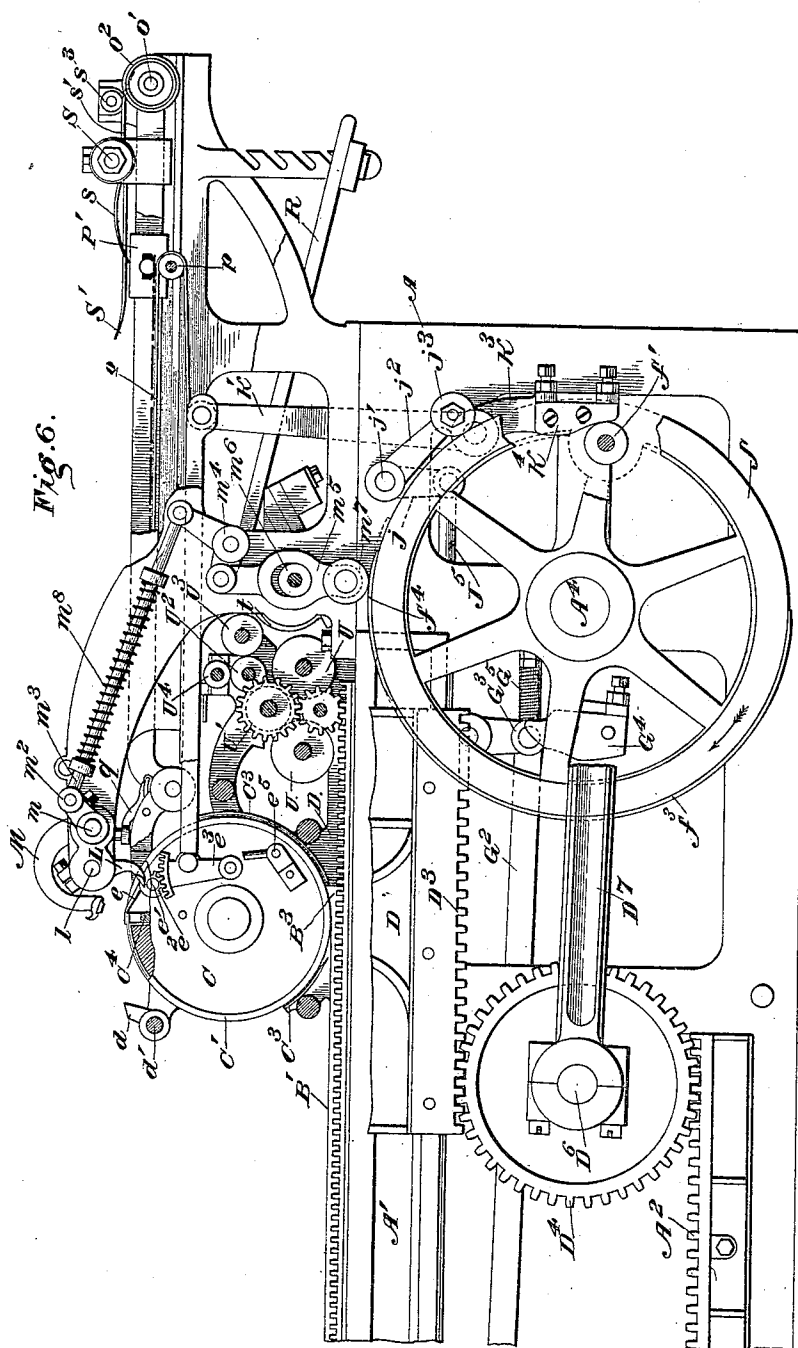
8 Sheets—Sheet 5.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



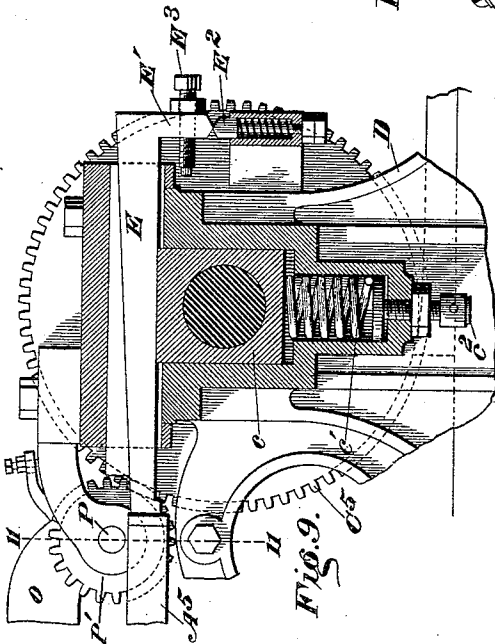
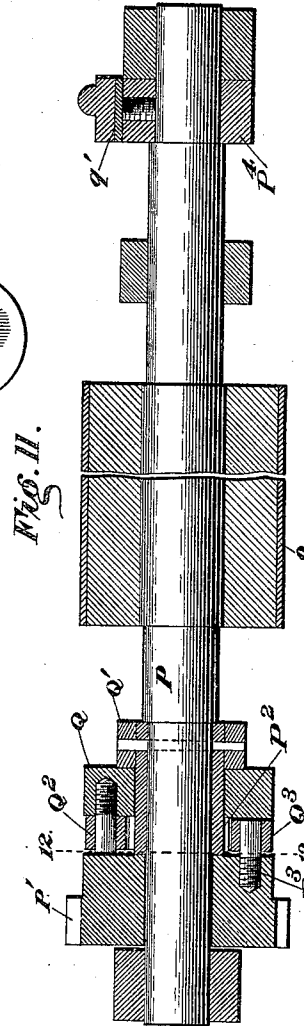
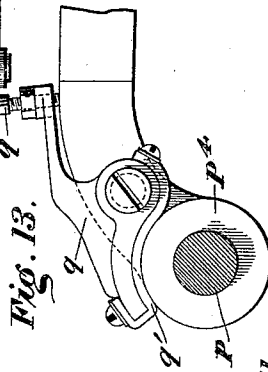
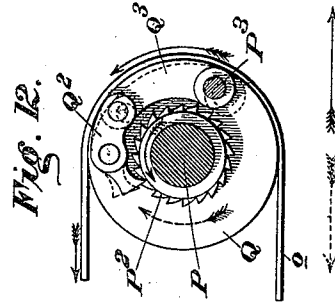
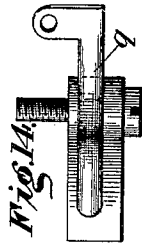
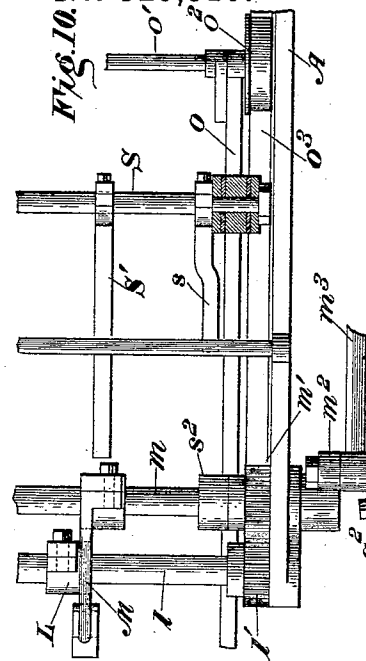
Witnesses:
M. E. Fowler
Jas. R. Mansfield

Inventor:
Joseph L. Cox
By his Attorneys *Weyand & Sowell*

J. L. COX.
SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:

M. E. Fowler
Geo. B. Mansfield

Inventor:

Joseph L. Cox

By his Attorneys: *Alexander F. Dowell*

(No Model.)

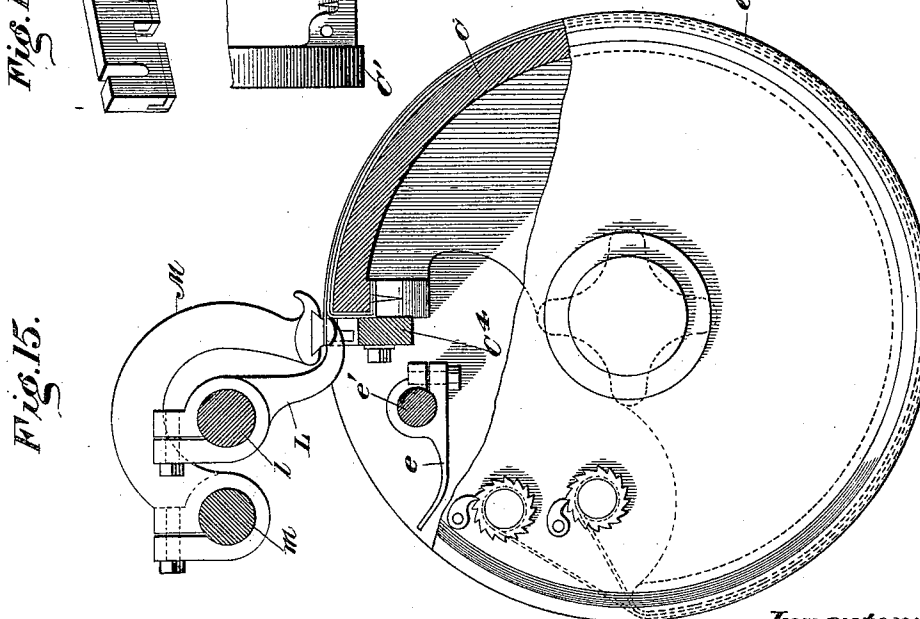
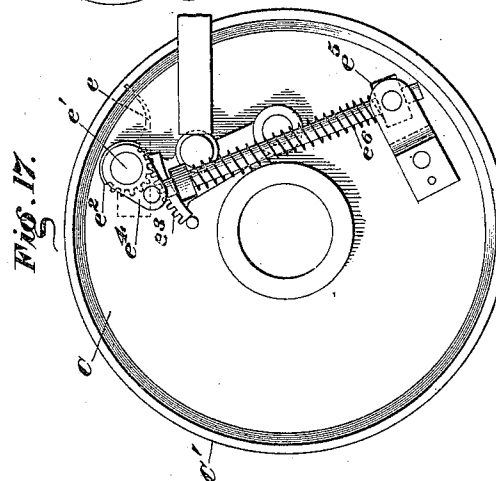
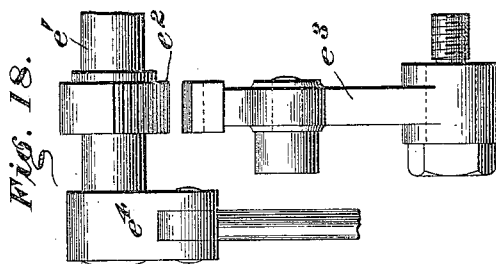
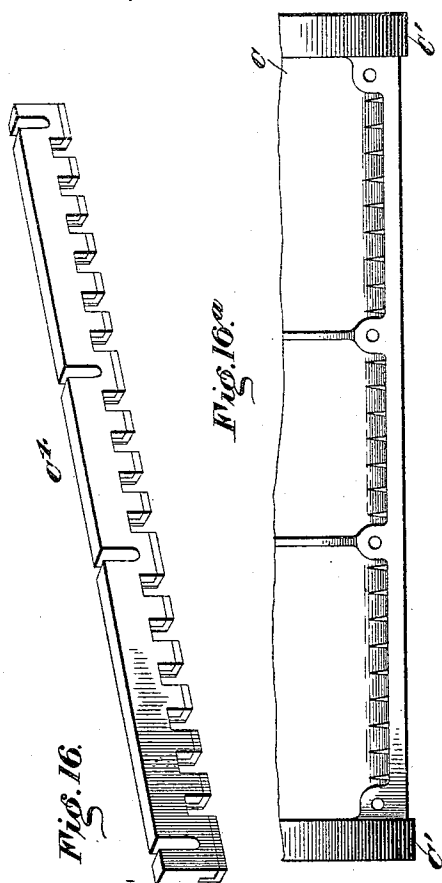
8 Sheets--Sheet 7.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:

M. E. Fowler
Jas. Mansfield

Inventor:

Joseph L. Cox

By his Attorneys: Alexander & Snell

(No Model.)

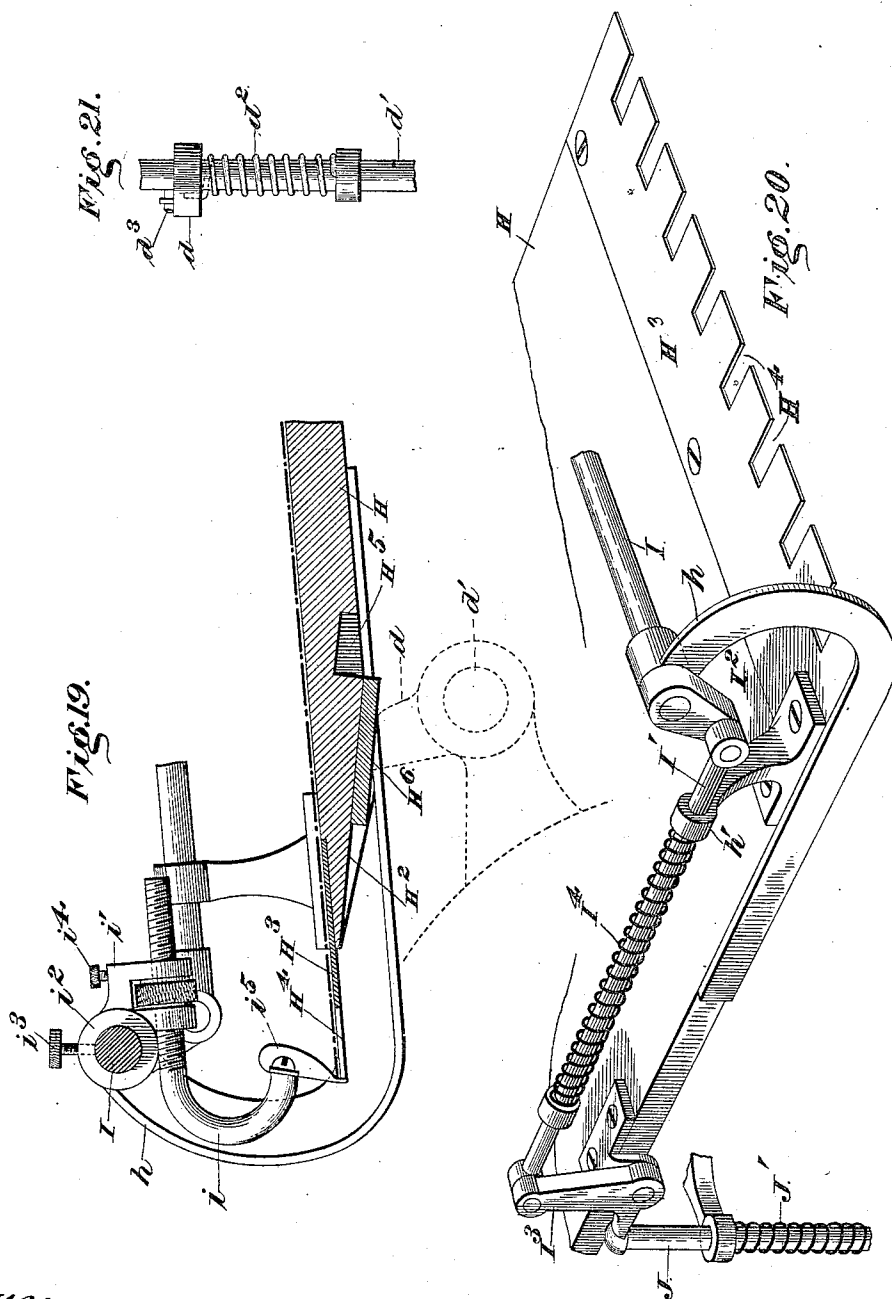
8 Sheets—Sheet 8.

J. L. COX.

SINGLE ACTING SHEET PRINTING PRESS.

No. 529,519.

Patented Nov. 20, 1894.



Witnesses:

M. E. Fowler
J. G. Mansfield

Inventor:

Joseph L. Cox

By his Attorneys: *Alexander F. Soull*

UNITED STATES PATENT OFFICE.

JOSEPH L. COX, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO THE DUPLEX
PRINTING PRESS COMPANY, OF SAME PLACE.

SINGLE-ACTING SHEET-PRINTING PRESS.

SPECIFICATION forming part of Letters Patent No. 529,519, dated November 20, 1894.

Application filed July 25, 1893. Serial No. 481,429. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. COX, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Single-Acting Sheet-Printing Presses; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My present invention is a single acting sheet printing press, employing a stationary bed and a locomotive cylinder which is thrown off while being traveled in one direction.

It consists in the novel construction of the throw-off mechanism, the sheet feeding mechanism; the sheet delivery mechanism; in the novel combinations of such mechanisms; and in other novel details of construction, combination, and arrangement of parts herein-after fully described and clearly shown in the accompanying drawings, in which—

Figure 1 is a side elevation of the press showing the carriage about midway of its travel toward the feed end of the machine, the main driving gear and crank wheels revolving in the direction of the arrows. Fig. 2 is an enlarged transverse sectional view of the press on line 2—2 of Fig. 1 looking in the direction of the arrow. Fig. 3 is a detail side view showing the mechanism for revolving the ink roll in operating position. Fig. 4 is a transverse sectional view on line 4—4 Fig. 1 looking in the direction of the arrow. Fig. 5 is a central longitudinal sectional view of the whole machine, broken away in the center of the bed, showing the cylinder at the full limit of its travel toward the feed end of press, and the cylinder grippers gripping the paper. Fig. 6 is an enlarged side elevation of the delivery half of the press, the upper rear portion of the frame being broken away. In this figure, the carriage the upper portion of which is broken away, is nearly at the limit of its rearward travel, and the delivery grippers are shown open ready to receive the paper when they shall have been tripped by the short cam on the periphery of the off crank wheel moving from beneath the roller on the lower end of the vertically movable slotted

lever, and showing further the roller on inner side of the crank wheel about to engage the rear swinging cam thereby forcing the arm forward that trips the cylinder gripper shaft to release the sheet. Fig. 7 is a detail perspective view of the delivery grippers. Fig. 8 is a detail edge and side view of the forward swinging cam. Fig. 9 is a detail transverse sectional view taken through line 9—9 Fig. 4, showing the means for forcing the wedge forward thus allowing the cylinder to be thrown off impression. Fig. 10 is a detail plan view of one side of the rear upper portion of the frame showing the intermeshing gears on the delivery gripper shafts, the friction bearings of the stripper shaft, and the relative position of the trip on said stripper shaft, and the collar on the rear delivery gripper shaft which operates said trip. Fig. 11 is a detail transverse section through line 11—11 Fig. 9. Fig. 12 is a similar view through line 12—12 Fig. 11, showing in full lines the pawl forced in engagement with the ratchet wheel fixed to the front canvas belt carrying shaft through the medium of the friction leather at opposite end of shaft, by the rearward movement of the carriage in the direction of the full lined arrow, and showing in dotted lines the disengagement of the pawl through the medium of the aforesaid leather, when the carriage travels in the direction of the dotted arrow. Fig. 13 is a detail side view showing disk on shaft and the rubber bearing on same. Fig. 14 is a plan view of the rubber arm. Fig. 15 is a detail end elevation partly in section, of the cylinder in connection with the delivery grippers, showing the paper gripped by the same when the cylinder has traveled the slight distance rearward from the position shown in Fig. 6. Fig. 16 is a detail view in perspective of the notched bar, and Fig. 16^a is a detail edge view of that part of the cylinder to which said bar is secured. Fig. 17 is an end view of the cylinder looking from the off side of the press, showing the devices for tripping the cylinder grippers and causing them to assume the position shown in Fig. 15. Fig. 18 is a detail view of said cylinder gripping devices. Fig. 19 is a detail sectional view of the rear edge of feed board showing in dotted lines the trip

for raising same out of the way of the cylinder. Fig. 20 is a detail perspective view of front edge and portion of side of feed board. Fig. 21 is a detail view of the spring-actuated

5 trip.

As shown in the drawings the press has a single, stationary horizontal flat type bed arranged midway of the machine, a feed table at one end of the machine, and a delivery

10 table at the opposite end thereof. Beneath this table above the level of the type bed is an ink fountain, and above the table is a novel sheet delivering apparatus. The impression cylinder is provided with

15 grippers and is journaled in reciprocating carrier castings at each side of the machine, said castings being supported and guided in ways on the main frame and sliding back and forth alongside the bed, reciprocating the im-

20 pression cylinder causing it to make one complete revolution over the bed and stop with its grippers uppermost at each end of its stroke. The cylinder is provided with novel devices

25 for throwing it off and on impression, so that it prints going in one direction only, and gives up the sheet as it moves in the contrary direction. Form inking rollers and ink distributing rollers are journaled in the carriers

30 at one side of the cylinder next the delivery board so as to be supplied with ink from the fountain above mentioned. The carriers are reciprocated back and forth by means of reciprocating gears which

35 mesh with racks on the lower side of the carriers and stationary racks on the main frame, the gears being reciprocated by means of pit-

40 men connected to crank wheels on the main shaft. This construction enables me to give the necessary movement to the carriers with

45 small crank wheels, and relieves the carriers from the varying strains or pressures incident to the reciprocation of the pitmen by the

50 crank wheels. Referring to the drawings by letter, A designates the main frame, B the type bed, and C the impression gripper cylinder journaled

55 in carrier castings D, D, one at each side of the machine having lugs D' that enter guide

60 grooves A' in the sides of the main frame. The cylinder is provided with bearer flanges

65 C' running upon bearers B' on the bed, and with a gear C² meshing with a bed rack B² as is usual in bed and cylinder presses. At each

70 side of the cylinder are guards C³ to prevent smearing or falling of the sheet which is carried around the cylinder during imprinting

75 without tapes. The shaft of the cylinder is journaled in vertically movable boxes c in

80 castings D, which boxes are forced upward by means of springs c' which can be adjusted by

85 screws c² as indicated in Figs. 1, 4 and 9. When the boxes are raised by the springs the

90 cylinder is also raised off the type plane and thrown off impression. The boxes are forced

95 down however against the tension of the springs and held down during one movement

of the cylinder from right to left while the impression is being made by means of sliding tapered keys E, placed in longitudinal grooves 70 over the journal boxes c lying horizontal and at right angles to the cylinder, as shown clearly in Figs. 1, 4 and 9. These keys are alternately shifted back and forth as the cylinder reciprocates, by means of tappets lo-

75 cated at opposite ends of the beds and hereinafter described. The larger ends of keys E have a depending stud E' which is double beveled on its end, and engages with the similarly beveled head of a spring-actuated locking pin E² as shown, by which the key is 80 locked when shifted in either direction so as to prevent a casual displacement thereof. An adjusting bolt E³ is tapped through this lug E' for regulating the position of the key. The 85 cylinder is also provided with a set of gripping fingers e mounted on a shaft e' on the end of which is a small pinion e² which meshes with a sector e³ which is rocked back and forth by contacting tappets at the feed and deliv- 90 ery ends of press, and thereby closes or opens the gripper fingers. On the end of the cylinder gripper shaft is also mounted a short crank arm e⁴ to which is pivotally connected one end of a spring controlled rod which plays 95 through a rocking guide e⁵ on the end of the cylinder and is forced toward the rock shaft by the spring e⁶. By this arrangement the gripper fingers are held open or closed after they are shifted, as the crank arm swings past 100 the dead center; i. e., a direct line between the axis of gripper shaft and guide e⁵. On the lower edges of carriers D are se-

105 cured inverted racks D³ which are meshed by reciprocating gears D⁴ which mesh with racks A² on the main frame. These gears are provided with bearer flanges D⁵ which run upon bearers A³ on the main frame, and relieve the gear and rack teeth of weight. The gears are 110 journaled on a transverse shaft D⁶ which is reciprocated back and forth by means of pitmen D⁷ connected to crank wheels F, f fixed on the main shaft A⁴ at opposite sides of the main frame. Said main shaft may be driven 115 from any suitable power in any suitable manner. As shown I have cut gear teeth on crank wheel F and drive it by a small pinion on an auxiliary shaft A⁵ which is provided with belt pulleys as indicated in Figs. 1 and 120 2 of the drawings. The crank wheels are preferably rotated in the direction of the arrows (to the right) so that the thrust and weight of the pitmen will be upon the gears D⁴ and thereby transferred to the main frame and not to the carriers. 125

The gripper-actuating sector is tripped at the feed end of the press so as to close the cylinder gripper fingers by a horizontal longitudinally movable tappet bar G- playing 130 through guide loops or brackets on the feed board supports and alternately thrown forward or backward by a vibrating lever G' pivoted thereto at one end and at its other end to the main frame. This lever G' in turn

is vibrated by means of a rod G^2 which connects it with a swinging cam lever G^3 (see Fig. 8) which is hung on a pin at the "off" side of the machine next the off crank wheel f .

5 On the outer face of lever G^3 is adjustably secured a cam block G^4 which stands in a position to be engaged and shifted by a roller f' on wheel f , which roller may be mounted on the inner end of the crank-pin F^2 of said crank-wheel. The cam lever G^3 is pushed forward by means of a spring G^5 so that tappet bar G will be normally kept out of position for contacting the sector e^3 , and will be suddenly projected forward to shift said sector when the cylinder has reached its extreme right-hand movement and is stopped during the time the crank wheels are passing the forward dead-center; thus permitting ampl. time for the sheet to be fed to the cylinder and properly adjusted before the gripper fingers are closed thereon.

The feed-board H resembles an ordinary feed board and is hinged or pivoted as at H' so that its inner or delivery end can be raised and lowered. The inner end of the board is beveled as at H^2 (see Figs. 5, 19 and 20) and is provided with a metallic shield piece H^3 which has a series of notches H^4 in its front edge to permit the cylinder finger grippers to close upon the sheet while it lies upon the table.

On the carriers D at the right hand side of the cylinder are two or more dogs d mounted on a shaft d' and normally kept in vertical position by means of springs d^2 and stops d^3 which prevent backward turning of the dogs. (See Figs. 5, 19 and 21.) As the cylinder reaches the end of its right hand stroke (toward the feed board) these dogs engage the lower beveled edge of the feed board and lift it so that the sheet of paper is lifted out of the way of the cylinder so that it will not be disturbed thereby. When the cylinder completes its backward stroke, the dogs d slip into notches H^5 in the under side of the feed board and the latter drops so as to lay the edge of sheet onto the cylinder in position to be gripped. When the cylinder moves forward (toward the delivery) the springs allow the dogs to turn on shaft d' and slide from under the board. The under edge of board may be protected by metal plates H^6 where the dogs contact therewith.

I designates a rock shaft lying transversely over the front edge of the feed board and journaled in brackets h attached thereto. On this shaft are secured the paper stops. The stops are shown most clearly in Figs. 19 and 20. It will be noticed that each stop consists of a bent rod i the straight portion of which is screw-threaded and passes through openings in a bifurcated lug i' depending from a sleeve i^2 on the shaft I , so that rod i stands at right angles to the shaft. A thumb nut is placed on the rod i between the bifurcations i' so that the rod i can be adjusted, and both rod i , and sleeve i^2 may be locked in position

by set screws i^3 , i^4 , respectively. On the extremity of the curved portion of rod i is affixed the stop piece i^5 . The shaft I is turned so as to normally hold stops i^5 against the teeth on piece H^3 of the table, (see Figs. 19 and 20) by means of a spring controlled rod I' playing through a guide bracket h' on the feed table, and pivotally connected to a crank arm I^2 on shaft I , at one end, and to a bell crank lever I^3 at its other end which is pivoted upon the table H as shown, a spring I^4 being slipped on rod I' between bracket h' and a collar on the rod as shown. From the foregoing it will be seen that the stops are movable with and supported by the feed table.

The bell crank lever I^3 is shifted at the proper time so as to rock shaft I and throw the stops out of the way by means of a vertically movable rod J playing through guide lugs on the main frame and pivotally connected at its lower end to an arm J^2 secured to the outer end of a stub shaft J^3 on the inner end of which is a crank arm J^4 (at right angles to arm J^2) which is connected to one end of a rod J^5 which extends forward to and beyond the main shaft, and its other end is connected to a crank arm j fixed on a stub shaft j' journaled in the side of the frame, just exterior to the periphery of crank wheel f , and on the outer end of shaft j' is fixed a crank arm j^2 which has a roller j^3 on its outer end running upon the periphery of crank wheel f and adapted to be engaged by a long cam f^3 on the periphery thereof as indicated in Fig. 5, said cam extending about half way around the periphery of said crank wheel. By this means the stops are positively lifted out of the way during the forward stroke of the cylinder, while the sheet is being drawn off the board, and are then permitted to drop in position to allow the feeder to adjust a new sheet upon the feed board. A spring J' is put on rod J to force it down when roller j^3 is off cam f^3 .

When the cylinder reaches the forward limit of its travel, the gripper fingers thereof are opened by means of a tappet bar K which engages sector e^3 as indicated in Fig. 6. This bar is mounted in suitable guides on the frame of the delivery table and is reciprocated at the proper times by means of a vibrating lever K' fixed on the inner end of a short rock shaft K^2 journaled in the frame beside crank wheel f , and on the outer end of shaft K^2 is secured a depending lever K^3 to the outer face of which is secured an adjustable cam block K^4 (see Figs. 2 and 6) which cam block is contacted by the roller f' on the crank pin f^2 of wheel f . The cam block K^4 is about diametrically opposite the cam block G^4 , so that the cylinder grippers are alternately opened and closed by the direct action of these cams alternately during the revolution of these crank wheels. The cam however is so arranged that the cylinder grippers will not be opened until the delivery grippers have nipped the sheet. A rod K^5 is

pivotally connected to lever K' and plays through guides on the frame, and a spring K^6 is arranged on this rod so as to cause the retraction of bar K when the roller j^3 disengages the cam block K^4 thus holding tappet bar K out of operative position.

The delivery apparatus is peculiar. It consists of a double set of coacting gripper fingers L , and M , respectively mounted on parallel rock shafts l , m , journaled in brackets attached to the side frame in such position that they overlie the cylinder when it is at its extreme left hand position. The grippers L are the under grippers and are mounted on the inner shaft, and the grippers M are the upper grippers and are mounted on the rear shaft curving over the shaft l in position to engage with the adjoining gripper L . (See Figs. 5, 6, 7, 10, and 15.) These grippers may be faced with rubber or other suitable facing to insure a positive bite on the sheet. The gripper shafts l , m , are provided with intermeshing pinions l' m' at one end so that they are simultaneously rocked in opposite directions thereby closing or unclosing the grippers. Shaft m has a crank m^2 on one end to which is pivoted one end of a rod m^3 the other end of which is connected to an arm of a bell crank lever m^4 pivoted on the side of the frame above crank wheel f , the short arm of lever m^4 being pivoted to a vertically movable lever m^5 which is guided by a pin m^6 playing through a slot therein, and has on its lower end a roller m^7 which runs upon the periphery of crank wheel f and is adapted to engage a short cam f^4 on the periphery thereof beside the long cam f^3 . (See Fig. 6.) A spring m^8 is arranged on rod m^3 so as to assist in normally holding the grippers L , M , closed, except when roller m^7 is on cam f^4 . The cam f^4 is so located that it causes grippers L , M , to open just as the cylinder reaches the forward end of its stroke. (See Fig. 6.) Grippers L are then in position to enter between the cylinder gripper fingers, and beneath the edge of the sheet, when the cylinder has reached its extreme forward movement stopping with the grippers uppermost, the cam f^4 moves from beneath levers m^5 , and grippers L , M , close upon the edge of sheet, and immediately thereafter the cylinder grippers are caused to release the edge of sheet as above described, these actions taking place while the crank pins are passing the forward dead-centers.

To facilitate the proper gripping of the sheet by fingers L , M , the cylinder may be provided with a toothed bar C^4 (see Figs. 4, 5, 6, and 16) between the teeth of which, grippers L enter, while the cylinder gripper fingers bite the paper against the teeth thereof.

As the cylinder reaches the forward limit of its stroke, the keys E are forced out by tappets A^5 affixed to the main frame as shown, thereby allowing the springs to raise the cylinder and throw it off impression. To assist this action of the springs and insure the

throw off, the bearers on the bed are slightly inclined upward at their forward extremities as indicated at B^3 , Fig. 6, so that the cylinders will be positively lifted off impression, and the springs will sustain them in non-printing position during their backward movement over the bed, until just before they reach the feed table, the keys E are driven in by tappets E^4 which are preferably mounted on a rock-shaft E^5 which can be rocked by a pivoted lever E^6 and connecting rod E^7 (shown in Figs. 1 and 5) so as to throw these tappets out of operative position when it is not desired to have the cylinder print thus enabling the pressman to work up ink on the forms and form rollers without printing; and the feeder to "throw off" the impression, when "missing a sheet"—to prevent soiling the "make ready" or cylinder packing. In their normal position however tappets E^4 will contact keys E and force them in thus throwing the cylinder on impression or into printing position. To the carriers D at the delivery side of the cylinder are connected two bars O , O , which extend rearward and are connected to a transverse shaft O' on the ends of which are wheels O^3 running upon ways O^3 fixed to the side frames. (See Figs. 1, 5, 6, and 10.) These bars O and shaft O' constitute a sheet delivery carriage. In the forward ends of bars O is journaled a transverse shaft P , and near the rear ends of said bars is a transverse shaft p journaled in brackets p' adjacently attached to the bars O . An endless belt o is run over shafts P , p , as shown in Figs. 2 and 5, and is turned in the direction indicated by the arrows in Figs. 1 and 5 by means of a pinion P' on the end of shaft P meshing with a gear C^5 on one end of the cylinder. (See Figs. 1 and 9.) It is desired to rotate shaft P only in one direction and as the cylinder is traveling backward, therefore I employ a clutch device, illustrated in Figs. 11 to 14 arranged as follows: The pinion P' is loose on shaft P beside the pinion but fixed on the shaft is a small ratchet P^2 whose hub is extended like a sleeve at the side opposite pinion P' , and on the extended portion is loosely fitted a ring Q which is confined in place by a collar Q' . A dog Q^2 is pivoted on the inner face of the collar (see Figs. 11 and 12) and to one end of the dog is pivoted one end of curved link Q^3 the other end of which is pivoted to a pin P^3 on the inner face of pinion P' . Of course as the cylinder reciprocates backward and forward the pinion P' is turned back and forth in a direction contrary to the rotation of the cylinder. When the cylinder travels forward, the pinion P' is rotated in the direction indicated by the dotted arrow in Fig. 12 on the collar Q (the pinion P' and the collar being connected by the dog Q^2 and link Q^3). This rotation of the pinion P' pulls the link Q^3 , and it in turn oscillates dog Q^2 so that the latter is thrown out of engagement with ratchet P^2 , as indicated in dotted lines Fig. 12, and consequently shaft P is not ro-

tated during the forward movement of the cylinder. In order to prevent the shaft turning casually, by the friction of the pinion and collar thereon, I employ a brake device consisting of a lever q pivoted on one of the bars O and having a leather q' on one end which bears upon the periphery of a small collar P^4 fixed to shaft P on the end opposite the pinion P' . The friction of the leather q' may be regulated by an adjusting screw q^2 in the outer end of lever q . The friction of this leather is not sufficient however to affect the positive rotation of the shaft P by the clutch devices.

When the cylinder moves backward, the link Q^3 causes dog Q^2 to oscillate and positively engage the ratchet as indicated in full lines Fig. 12. By this construction a noiseless but positive acting ratchet and pawl clutch is produced. Now after the cylinder has completed its impression stroke, and has been thrown off, and the imprinted sheet has been nipped by the grippers L, M , as above described, the cylinder begins its backward movement, and the sheet of paper is pulled from the cylinder by the grippers L, M , and dropped upon the belt which is moved forward with the cylinder, and beneath the grippers L, M . When the cylinder moves forward on its printing stroke, the carriage moves back beneath the grippers L, M , to and over the delivery board R carrying the previously printed sheet, face uppermost lying upon the belt o which is stationary during the forward stroke of the cylinder. The newly imprinted sheet is grasped by the grippers L, M , and as the cylinder again moves backward, the last imprinted sheet is drawn from the cylinder, and simultaneously the previously imprinted sheet is dropped upon the delivery board R below the carriage, as belt o is traveled in the direction of the arrows, by the rotation of shaft P , simultaneously with the bodily forward movement thereof with the delivery carriage. In brief, the sheet is carried back over the delivery table by a non-traveling belt during the forward stroke of the cylinder, and is then dropped upon the delivery table by the carriage moving from beneath the sheet, and the belt itself being rotated while traveled at such speed as to cause it to unwind or move from beneath the sheet which falls by gravity upon the delivery table (as indicated in dotted lines Fig. 1)—the carriage slipping from beneath one sheet simultaneously as it moves under another sheet.

In order to strip the sheet from the grippers L, M , I mount a rock-shaft S on the rear end of the bars O, O , and to it attach a number of upwardly curved tongues S' which pass between the adjoining pairs of grippers L, M , when the carriage is at the forward limit of its movement. The shaft has two spring cams s, s' at opposite sides and ends thereof, the first of which passes under a stop or roller s^3 on the end of shaft m when the carriage finishes its inward movement and is thereby de-

pressed so that tongues S' are turned down upon the belt, stripping the edge of the sheet from the grippers L, M , (which are just previously opened) and retain the sheet upon the belt (which is then stopped) until the carriage has completed its outward movement, when cam s' passes under a stop or roller s^3 journaled on a bracket on the main frame, and rocks shaft S so as to raise the tongues and free the sheet as indicated in Fig. 6.

The inking fountain T is mounted beneath the delivery-board and is of any suitable construction. The fountain roller has a ratchet t' on one end which is engaged by a pawl T' pivoted on a vibrating arm T^2 which is pivoted to the upper end of a vertically movable lever T^3 which is pressed upward by a spring T^4 . (See Figs. 1, 2 and 3.) The lower end of lever T^3 is slotted to fit upon a guide pin A^6 fixed to the main frame. A friction roller T^5 is secured to the outer face of lever T^3 in position to be engaged by a short cam F^2 on the crank wheel F , so that the fountain roller t is rotated once for each impression produced.

The form inking rollers U, U' , are journaled on the castings D at the side of the cylinder next the delivery table and are supplied with ink by a distributor D' receiving ink from a superimposed roller U^2 which is supplied with ink by a ductor roller U^3 , which however is kept in contact with roller U^2 but is adapted to contact the fountain roller when the carriers are at the end of their extreme forward movement, the fountain roller t being rotated by the means described just as and while roller U^3 contacts therewith. A distributor roller U^4 may be journaled above roller U^2 , and rollers U^4 and U' may be provided with screw-threaded journals so as to vibrate them simultaneously with their rotation, as in the ordinary rack and screw distribution inking rollers. The roller U' may be positively rotated by intermeshing pinions from the rack on the type bed, and the other rollers may also be intergeared so as to be positively rotated. Rollers U, U' , and U^3 are preferably mounted in adjustable bearings, but it is not new to do this.

V designates a hand lever at the feed end of the press fixed on one end of a rock shaft V' which is connected at its other end to the belt shifting devices so that the feeder can start or stop the machine at will. In operation the cylinder takes a sheet from the feed board, makes one revolution over the bed, during which it makes the impression, is thrown off at the delivery end of press, and the sheet is withdrawn from the cylinder by the stationary delivery grippers during the backward movement of the cylinder (while it is thrown off) and laid upon the delivery belt, and during the next forward stroke of the cylinder (imprinting a second sheet) the first sheet is carried back over the delivery table, and during the backward movement of the cylinder the first sheet is delivered on to the delivery board by the action of the endless belt on the

delivery carriage, while the second imprinted sheet is being withdrawn from the cylinder, the impression cylinder being alternately thrown off and on impression at the feed and delivery ends of bed, and the inking rollers rolling on the forms in both the forward and backward movements of the cylinder; all as hereinbefore described in detail.

It will be readily understood that many of the parts and combinations of parts which I have above described and shown in drawings can be readily adapted for use as or on a web printing machine, and therefore I desire to embrace them wherever used in any kind of printing press.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. In a printing press the combination of a bed, a reciprocating cylinder, and means for holding said cylinder off impression during its return stroke; with inclined portions or planes at one end of the cylinder-bed-bearers for raising said cylinders off impression, and means for holding said cylinder in impression on the forward stroke, substantially as described.

2. In a printing press the combination of a stationary bed, and a reciprocating cylinder and springs for holding said cylinder off impression during its return stroke; with inclined portions or planes at one end of the cylinder, bed bearers for lifting said cylinder off impression, and means for alternately compressing and releasing said springs, substantially as described.

3. The combination of the reciprocating gripper cylinder, the gripper actuating sector pivoted to one end thereof and the tappet bars at opposite ends of the press, with a rotating wheel, the swinging cam levers arranged near the said wheel and adapted to be alternately shifted by a pin on said wheel, and the connections substantially as described between the respective cam levers, and the tappet bars at opposite ends of the press, substantially as and for the purpose described.

4. The combination of the reciprocating gripper cylinder and the gripper actuating segment pivoted to the end thereof, substantially as described; with the tappet bar G lever G' rod G², and swinging cam lever G³, and a rotating wheel adapted to operate said cam lever, substantially as and for the purpose herein specified.

5. The combination of the reciprocating gripper cylinder and the gripper actuating segment pivoted on the end thereof, substantially as described; with the tappet K, lever K' and cam lever K³, and a rotating wheel adapted to operate said cam lever, substantially as described.

6. The combination of the reciprocating cylinder, its gripper mechanism substantially as described, the opposite tappet bars G and K for shifting said grippers, and the crank wheels and connections substantially as de-

scribed for reciprocating said cylinder; with the swinging cam carrying levers G⁴, and K³, suspended about diametrically opposite each other beside one cam wheel, the wrist-pin on said wheel adapted to alternately engage and operate the said cam levers, and the connections substantially as described between the lever G⁴ and bar G, and between lever K³ and bar K, all substantially as and for the purpose set forth.

7. In a printing press the combination with the bed and cylinder of a swinging lever, an adjustable cam block attached to said lever, springs for forcing said lever in one direction, and a pin on a rotating wheel adapted to intermittently engage said cam block and shift the lever in the opposite direction and a gripper mechanism operated from said lever, substantially as described.

8. In a printing press the combination of a stationary bed, a reciprocating gripper cylinder, springs for lifting said cylinder off impression, devices for alternately compressing and releasing said springs, a main shaft and connections for reciprocating said cylinder, and the gripper shifting tappet bars at opposite ends of the press, and the swinging cam levers and connections for alternately operating said tappet bars, said cam levers being alternately operated by a pin on a crank wheel of the main shaft, substantially as described.

9. The combination of the reciprocating carriers, the cylinder journal boxes thereon, the springs for upholding said boxes, the longitudinally movable wedge keys over said boxes, devices for locking the wedges when shifted and the cylinder journaled in said boxes, and the tappets for alternately contacting and shifting said keys, substantially as described.

10. The combination of the cylinder, its journal boxes, the springs for lifting said boxes, the longitudinally movable wedge keys for depressing said boxes, and the spring-actuated bolts for locking said keys when shifted, substantially as described.

11. The combination of the reciprocating gripper cylinder, with the grippers mounted on rock shafts journaled in fixed bearings on the frame; the mechanism substantially as described whereby said grippers are automatically closed upon the sheet when the cylinder finishes its forward stroke and draw the sheet from the cylinder as it travels backward to the feed end of press and means for subsequently carrying the sheet behind the grippers and dropping it upon the delivery table, substantially as described.

12. The combination of the reciprocating gripper cylinder, the delivery carriage reciprocated with said cylinder, the delivery grippers mounted on the main frame above the carriage and adapted to grip the sheet when the cylinder reaches the end of its forward stroke and draw it from the cylinder onto the delivery carriage as the cylinder and carriage move backward, and means for removing the

sheet from the carriage during the next backward movement of the cylinder, substantially as described.

13. The combination of the reciprocating cylinders, and delivery carriage moving therewith, an endless belt on said carriage, and means substantially as described whereby said belt is traveled only during the backward movement of the cylinder; with grippers adapted to pull the imprinted sheet from the cylinder and drop it onto the endless belt as the cylinder moves backward, substantially as described.

14. The combination of the grippers *L*, *M*, their rock shafts *l*, *m*, the intermeshing pinions on said shafts, the crank arm *m*², spring-controlled rod *m*³, bell crank lever *m*⁴ cam lever *m*⁵, and a cam in a wheel adapted to intermittently engage said lever, substantially as and for the purpose specified.

15. The combination of the reciprocating gripper cylinder, the delivery carriage reciprocated with said cylinder, the delivery grippers mounted on the main frame above the carriage and adapted to grip the sheet when the cylinder reaches the end of its forward stroke and draw it from the cylinder onto the delivery carriage, as the cylinder and carriage move backward, and the rock shaft on said carriage carrying tongues adapted to whip the sheet from the stationary grippers and hold it upon the carriage until the latter has reached the forward end of its travel, substantially as specified.

16. The combination of the reciprocating cylinder, and delivery carriage moving therewith, an endless belt on said carriage, and means substantially as described whereby said belt is traveled only during the backward movement of the cylinder; with stationary grippers adapted to pull the imprinted sheet from the cylinder and drop it onto the endless belt as the cylinder moves backward, and the rock shaft on said carriage carrying tongues adapted to whip the sheet from the stationary grippers and hold it upon the endless belt until the carriage has reached the end of its forward travel, substantially as described.

17. The combination of the reciprocating cylinder and the reciprocating delivery carriage movable therewith, the endless belt running over shafts journaled in said carriage the gearing between the cylinder and the adjoining one of said shafts, and clutch devices substantially as described whereby the shaft is rotated only when the cylinder moves backward, and stationary grippers for transferring the sheet from the cylinder to the belt substantially as described.

18. The combination of the bed, a reciprocating cylinder and a throw off mechanism; with a sheet delivery carriage connected to and moving with said cylinder, endless carrying tapes mounted on said carriage, and mechanism whereby the tapes are traveled in but

one direction, and only during the non-printing stroke of the cylinder, and means for transferring the sheet from the cylinder to the carrying tapes substantially as set forth.

19. In a sheet printing press the combination of a reciprocating gripper cylinder, a throw off mechanism, a sheet delivery carriage reciprocating with said cylinder, endless carrier tapes mounted on said carriage and mechanism whereby said tapes are traveled only during one stroke of the cylinder, and means for transferring the sheet from the cylinder to the tapes, whereby the sheet is first transferred from the cylinder to the carriage and upon one stroke of cylinder, and then transferred from carriage to table upon the next similar stroke of the cylinder, substantially as and for the purpose set forth.

20. The combination of the cylinder, the carriage beside the cylinder, the shaft journaled on said carriage, the sheet carrying devices operated by said shaft, the ratchet fixed on the shaft, the pinion and collar at opposite sides of said ratchet loosely mounted on the shaft, the dog pivoted on said collar, and the link pivotally connected to one end of said dog and to the face of the pinion, and means for rotating the pinion as it travels with the cylinder, substantially as described.

21. The combination of the cylinder, the carriage beside the cylinder, the shaft journaled on said carriage, the sheet carrying devices operated by said shaft, the ratchet fixed on the shaft, the pinion and collar at opposite sides of said ratchet loosely mounted on the shaft, the dog pivoted on said collar, and the link pivotally connected to one end of said dog and to the face of the pinion, and means for rotating the pinion as it travels with the cylinder, and the friction rubber for retarding the rotation of said shaft, substantially as specified.

22. The combination of a stationary bed, reciprocating carriers, a main shaft, crank wheels thereon, and connections for reciprocating said carriers; a gripper cylinder and form inking mechanism mounted on said carriers; the feed board and paper stops thereon; the delivery grippers and ink fountains; and the separate sets of cam levers and connections substantially as described, for respectively operating the gripper segments,—paper stops,—and the delivery grippers, by cams upon one of the crank wheels, and the lever and connections for rotating the fountain roller, operated by a cam on the other crank wheel, all constructed and arranged to operate substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOSEPH L. COX.

Witnesses:

ARTHUR E. DOWELL,
JAMES R. MANSFIELD.