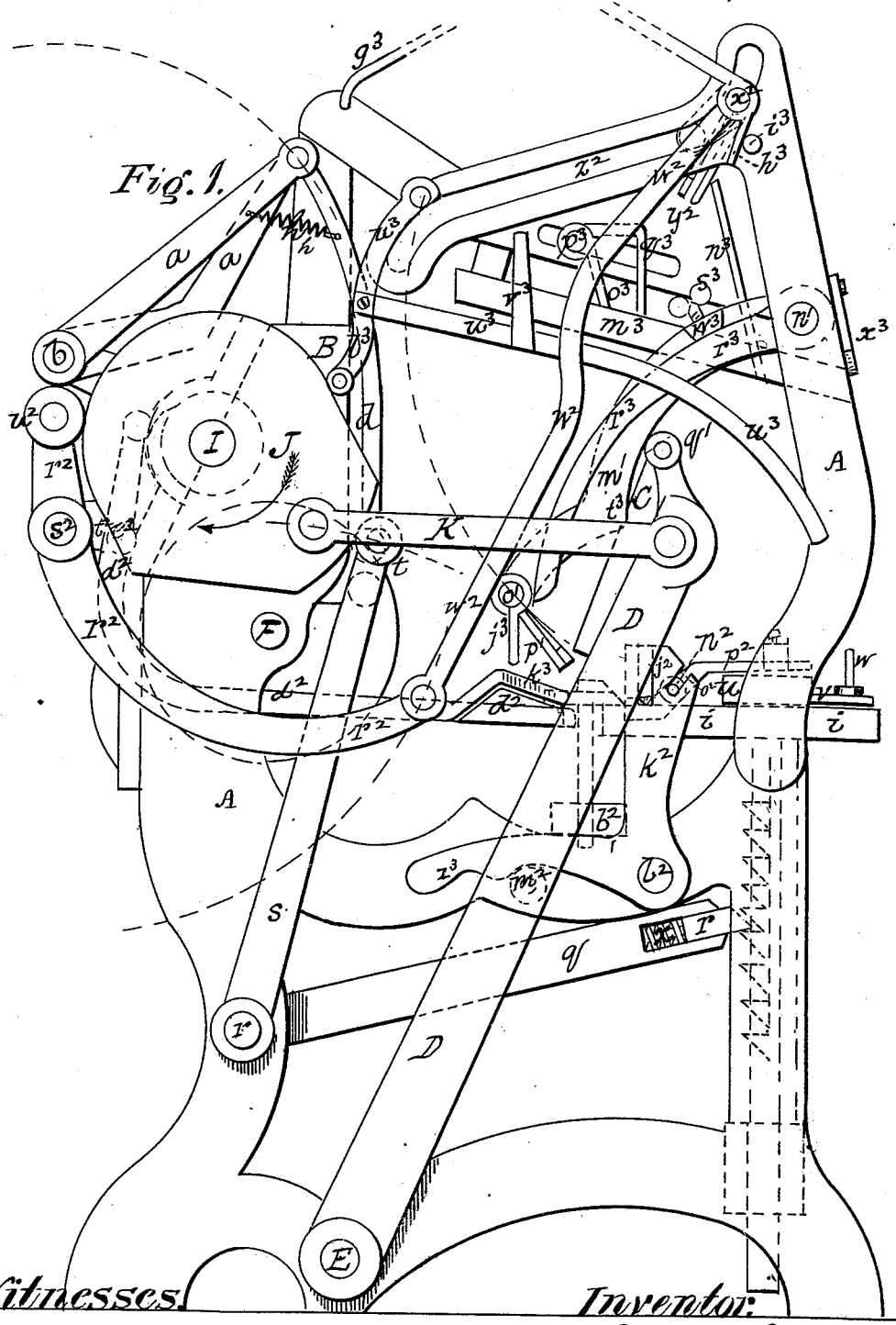
7 Sheets—Sheet 1.

R. J. STUART.

Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

Fig. 1.



Witnesses.

Alfred Sheldon.

Chas. J. Gilmore.

Inventor:

Robert J. Stuart,

per E. N. Johnson, Attorney

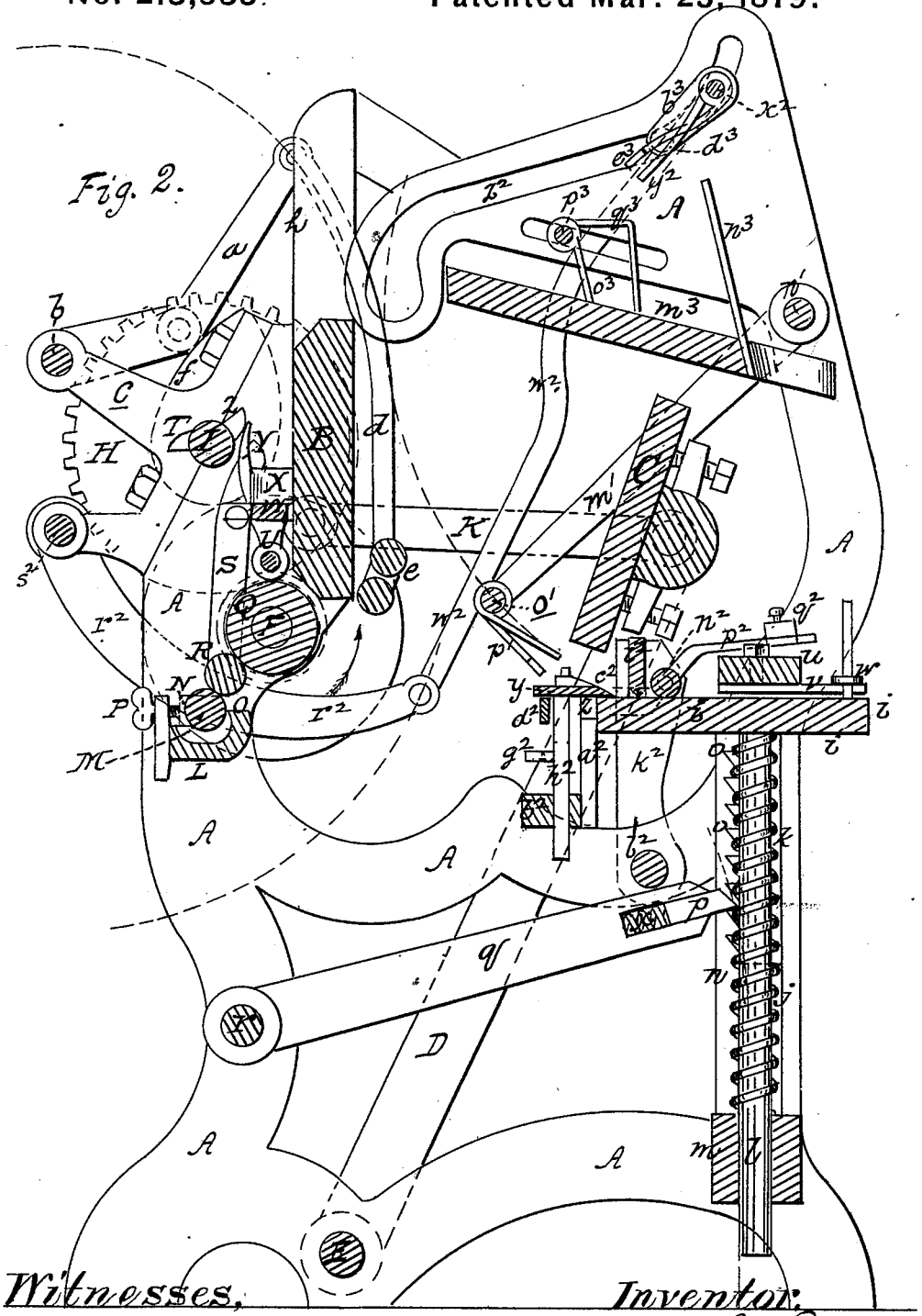
7 Sheets—Sheet 2.

R. J. STUART.

Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

Fig. 2.



Witnesses,

Alfred Theelock.
Chas. J. Gilmore.

Inventor:

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per E. N. Johnson, Atty.

7 Sheets—Sheet 3.

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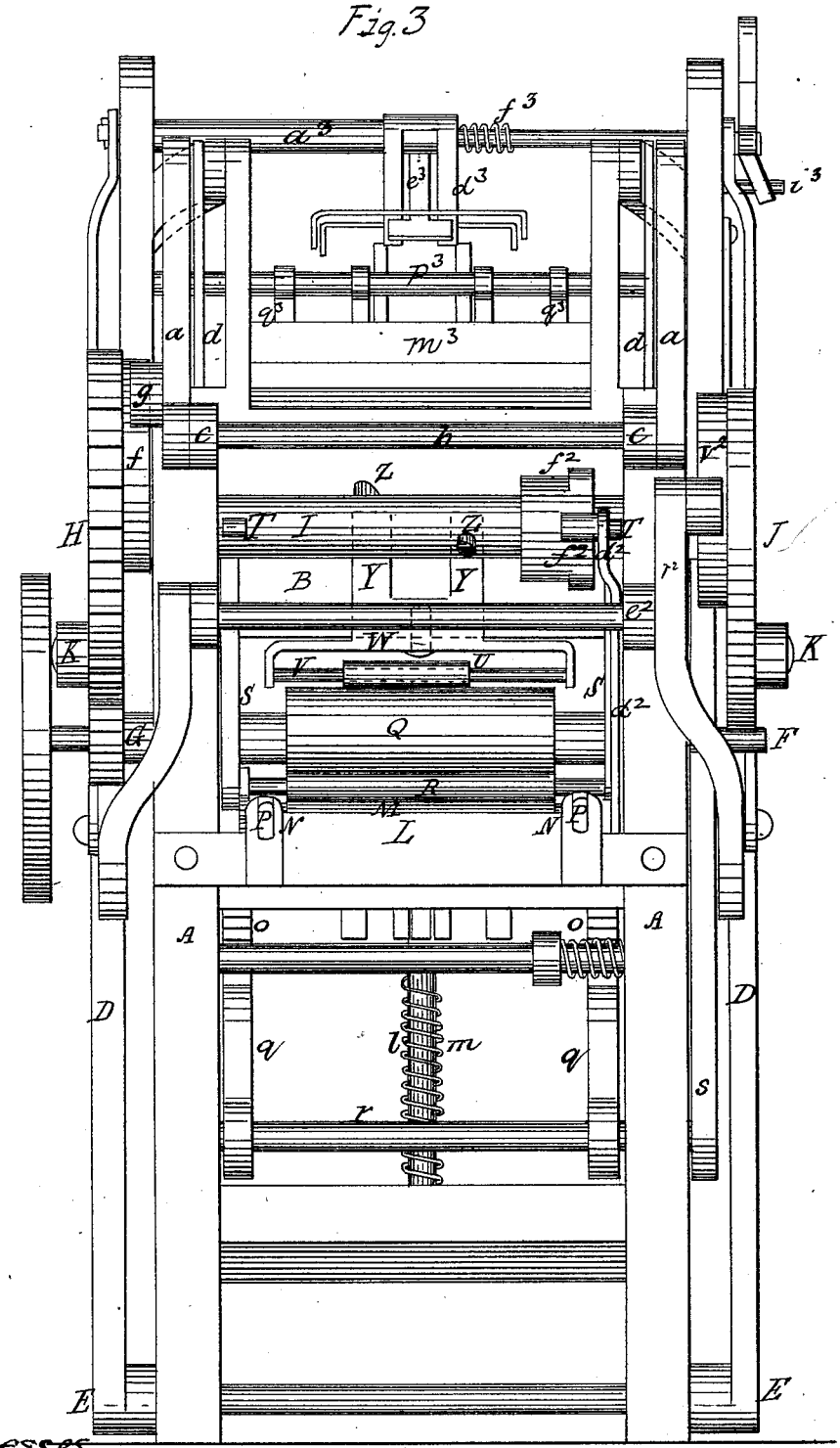
Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

Fig. 3



Witnesses
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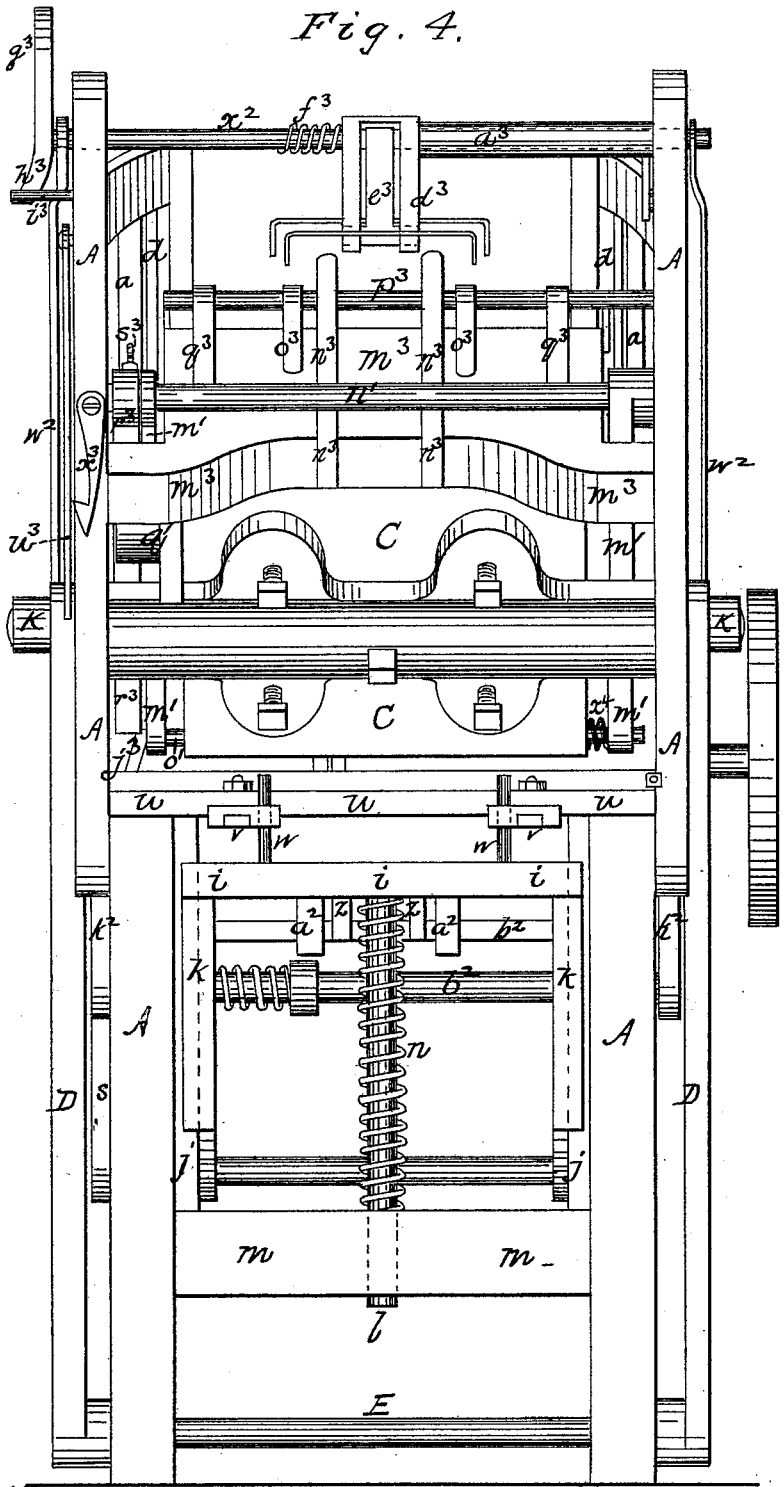
per E. N. Johnson, Atty

R. J. STUART.

Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

Fig. 4.



Witnesses,
Alfred Shedlock.
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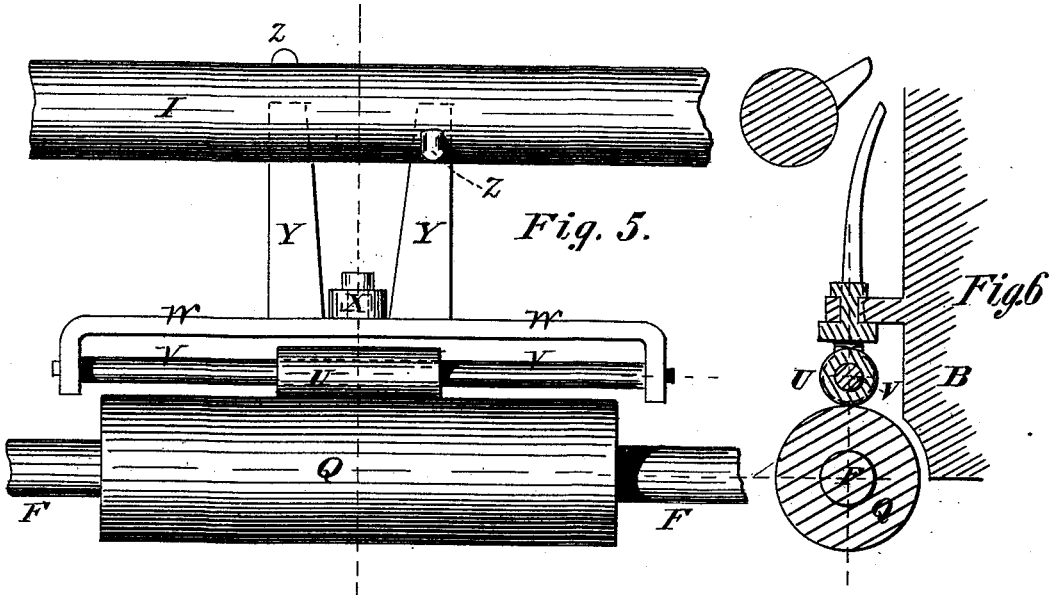
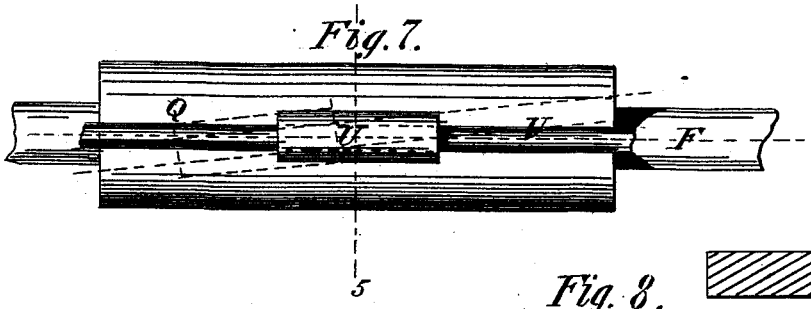
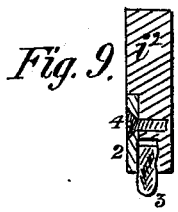
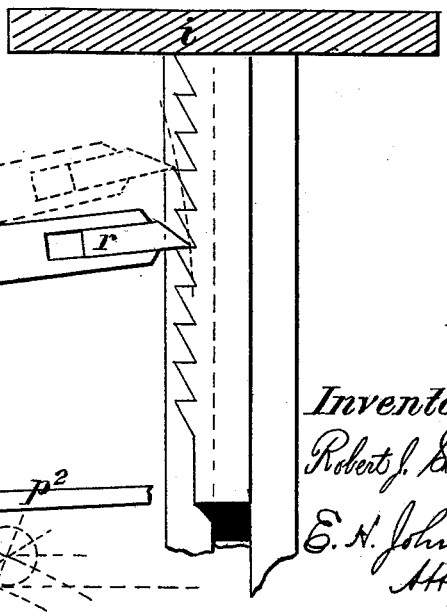
Printing-Press.

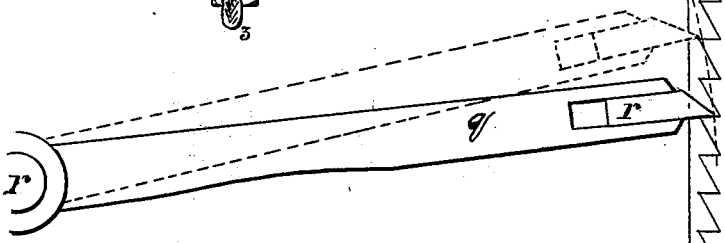
No. 213,535. Patented Mar. 25, 1879.



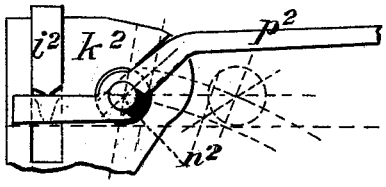








Witnesses.
Alfred Sherlock.
Chas J. Gilmore.



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7 Sheets—Sheet 6.

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Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

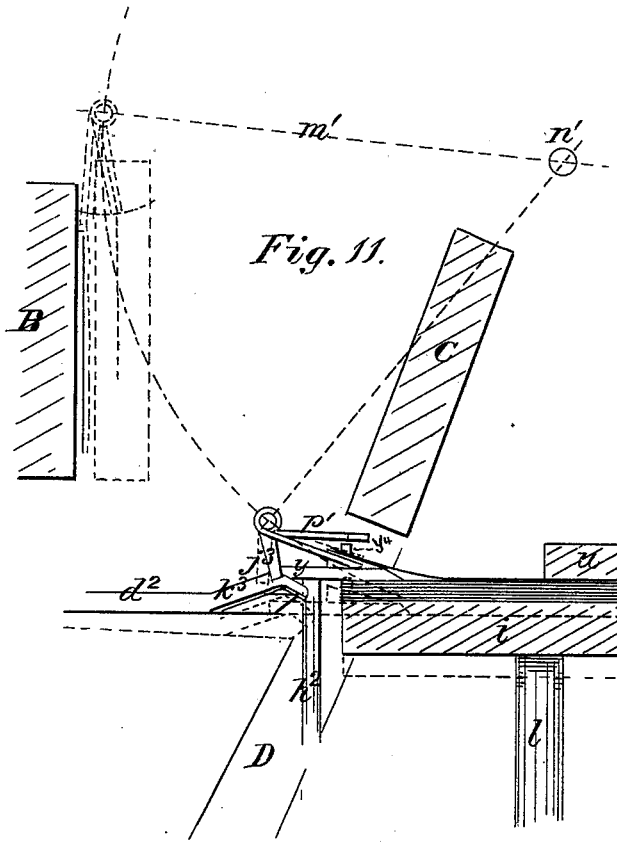

Fig. 11.

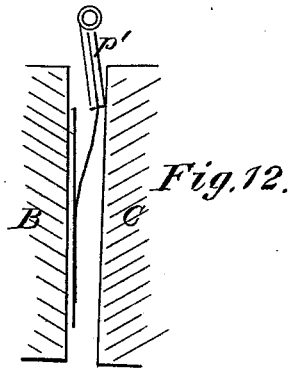

Fig. 12.

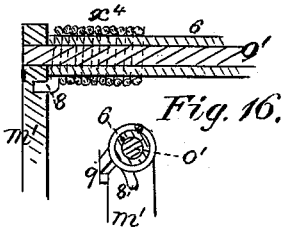

Fig. 16.

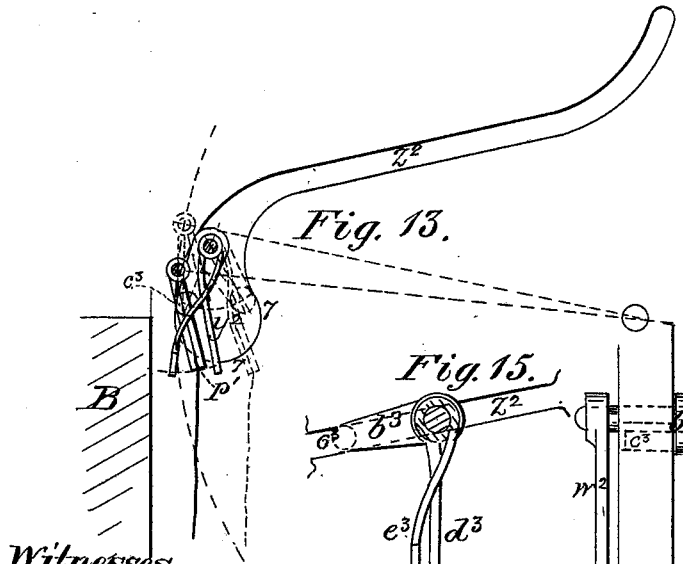

Fig. 13.

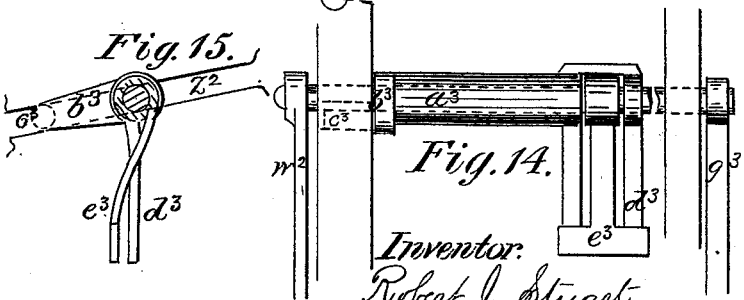

Fig. 15.

Fig. 14.

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per E. N. Johnson, Atty.

7 Sheets—Sheet 7.

R. J. STUART.

Printing-Press.

No. 213,535. Patented Mar. 25, 1879.

Fig. 17.

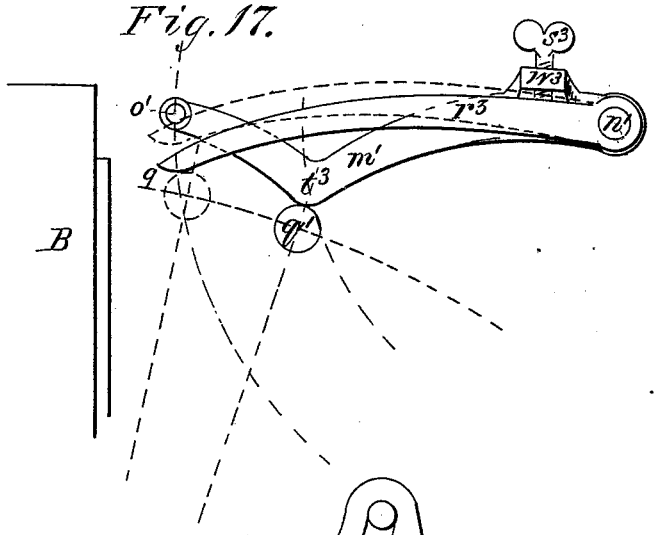
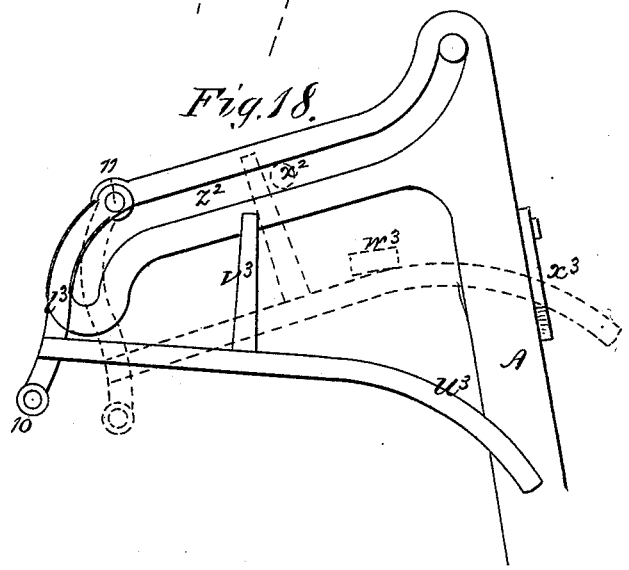


Fig. 18.



Witnesses,
Alfred Theodork:
Chas. J. Gilmore.

Inventor.
Robert J. Stuart,
for E. A. Johnson.
Attorney.

UNITED STATES PATENT OFFICE.

ROBERT J. STUART, OF YONKERS, NEW YORK.

IMPROVEMENT IN PRINTING-PRESSES.

Specification forming part of Letters Patent No. **213,535**, dated March 25, 1879; application filed November 16, 1877.

To all whom it may concern:

Be it known that I, ROBERT J. STUART, of Yonkers, in the county of Westchester and State of New York, have invented certain Improvements in Printing-Presses, of which the following is a specification:

My invention relates principally to that class of printing-presses known among printers as "job-presses," but is not necessarily confined thereto.

It consists in a novel construction, combination, and arrangement of parts, and has for its objects to render the feeding of the press and the delivery or piling of the printed sheets automatic, and also to improve the press in other respects, as will be hereinafter fully set forth.

In the drawings, Figure 1 is a side elevation. Fig. 2 is a vertical longitudinal section. Fig. 3 is a rear elevation; Fig. 4 a front elevation.

The remaining figures are detail views, and diagrams illustrating the operation of various parts of the press, and which will be referred to in the body of this specification.

The invention is shown as applied to a press having a vertical type-bed for receiving the form of type, and a platen, which oscillates to and from said bed.

The pile of sheets is supported on a horizontal table or platform, which is pressed upward by a spring tending to keep the top of the pile against a transverse stationary bar situated immediately above said table. The table is located behind and lower than the platen. A frictional rubbing-bar rests on the top of the pile of sheets toward the front edge thereof. A laterally-vibrating motion being imparted to this bar by appropriate mechanism, it draws the front edge of the top sheet from under a pressure-plate which rests on the front of the sheets. The edge of this plate, which rests on the pile, being beveled, the edge of the sheet passes over said plate on being brought forward by the rubbing-bar, and is held in position to be grasped by the jaws of vertically-oscillating nippers, which descend and close upon it. At this juncture the table is depressed, and the nippers carry off the sheet and hold it suspended between the platen and bed of the press while it receives the impression, which taking place, another pair of nippers seize the top edge of the sheet and take it to the piling-table, where it is properly deposited.

In the drawings, A represents the framing of the machine; B, the type-bed; C, the platen; D, the platen-arms, pivoted at E. F is the driving-shaft; G, a pinion thereon, which gears with the wheel H on shaft I, to the opposite extremity of which is secured the cam-disk J. K are links pivoted at one end to the platen-arms, and at the other to the gear H and disk J. Thus, as the shaft I revolves, the platen is oscillated to and from the type-bed B. L is the ink-fountain, secured to the side frames, as shown. In it revolves the fountain-roller M, having its bearings in journal-boxes N sliding on the ends of the fountain, and set up to the knife-edge or doctor O by thumb-screws P.

Q is the distribution-roller, which is directly on the driving-shaft F, or is an enlargement of the same. R is the roller journaled in oscillating arms S, whereby it may be thrown in between said fountain and distribution-rollers, thus forming an intermediate connecting-roller.

U is a traversing roller for distributing the ink on the distribution-roller Q. (See Figs. 5, 6, and 7.) It is a sleeve which revolves and slides on the rod V, supported immediately over the roller Q by the bar W, which is pivoted at its middle to a projection, X, from the back of the type-bed B.

From the bar W project upward two tappets, Y, one on either side of the pivot on which the bar W works. On the shaft I are two projections or toes, Z Z, which, as the shaft revolves, come alternately and respectively in contact with the tappets Y, thereby rocking the bar on its pivot.

The point at which the bar W is pivoted being in a line which intersects the axes of the rod V and roller Q, and being vertical to a horizontal plane, as the bar is oscillated each extremity of the rod is carried alternately from side to side of a vertical plane passing through the axis of the roller Q, so that it forms angles with such plane. A helical motion is thereby imparted to the sleeve-roller U, the direction and velocity of its advance along the rod being dependent on the position of the bar W relatively to the direction in which the roller

Q is revolving and the degree of the angle which the rod makes with the roller, as before stated.

a are arms, secured to the extremities of a shaft, *b*, journaled in the offsets *c* from the frame A. From the free ends of these arms are jointed the suspending-rods *d*, which carry at their lower extremities the type-inking rollers *e*. The arms are oscillated by the cam *f* on the inside of gear H, acting on an anti-friction roller, *g*, on one of the arms *a*. *h* are springs, which tend to keep the rollers against the face of the type. The oscillation of the arms *a* carries the rollers over the form and down to the distribution-roller Q, from which they receive their supply of ink.

The following is a description of the mechanism for automatically separating and feeding the sheets from a pile, and for piling the printed sheets: *i* represents the table or platform on which the pile of sheets is placed. (See Figs. 2, 4, and 8.) It is capable of a vertical motion, being guided in grooves *j* in the side frames, into which grooves the pieces *k*, projecting from the under side of the table, enter. *l* is a rod depending from the under side of the table, and passing through a hole in the guide *m*. *n* is a coil-spring surrounding rod *l*, and tending to force the table upward. On the inner side of the pieces *k* are the ratchet-racks *o*, with the teeth of which the detents *p* on the extremity of the arms *q* engage. The arms *q* are on the shaft *r*, to one extremity of which (outside of the side frame) is secured the arm *s*, (see Fig. 1,) provided with anti-frictional roll *t*, running against the edge of cam J. Thus as the shaft *r* is rocked by the revolution of cam J the table *i* is depressed at the proper moment. *u* is a stationary bar, secured to the side frames, and situated directly above the table. The spring *n* presses the table *i* or the pile of paper thereon against the bar *u*, which thus clamps the paper down on the table. From the bar *u* project the guides or gages *v w* for keeping the paper in its proper position on the table. The detent *p* slides between the jaws on the extremity of arm *q*, and is pressed outward by the spring *x*. The lowest point of the motion of the arm *q* is fixed, being determined by the cam J. The extent of its motion upward is, however, dependent partly on the height of the pile of paper. It is not, however, dependent on the total height of the pile, but on the successive sections of the pile, equal in thickness to the distance between the ratchet-teeth.

It is obvious that, the straight line in which the edge of the rack-teeth moves being secant to the arc of a circle in which the point of the detent moves, the gradual rise of the table will ultimately bring any tooth on which the detent may rest beyond the range of the detent, which then falls on the tooth next below.

y is a horizontal plate, supported upon short rods *z*, sliding vertically in the guides a^2, secured on the transverse bar b^2. One edge, c^2, of plate *y* is beveled, as shown in Figs. 2 and 11, and, when not elevated, rests on the table *i*. d^2 is a curved lever, pivoted at e^2, one end of which is bent horizontally at right angles and extends underneath the plate *y*. The other extremity is provided with an anti-frictional roll acted on by the cam f^2, Fig. 3. Thus as the cam revolves the plate is raised and lowered from and to the sheets. When the edge of the sheet is about to be passed over the edge of the plate it (the plate) is held firmly down on the pile of sheets by the weight of the lever resting on the pin g^2, projecting from the guide h^2. i^2 is the frictional rubbing-bar, to which is imparted a laterally-vibrating motion for separating the sheets. (See Fig. 10.) Its extremities rest in the slots j^2, cut in the vertical limbs of the levers k^2, pivoted at *l*, on either side of the frame. One of these levers (the one shown in Fig. 1) is bell-cranked, and the under edge of its horizontal limb is shaped with undulations, and rests on a stud or anti-frictional roller, m^2, projecting from the platen-arm D, so that as the platen-arm rocks to and fro a vibrating motion is imparted to the levers, the number of such vibrations being dependent on the number of undulations on the arm.

The lower edge of the bar i^2 is provided with a covering or strip of india-rubber or other frictional material, and rests on the pile of sheets at a point between the plate *y* and bar *u*. n^2 is a roller parallel with bar i^2, the ends of which take into slots o^2 in the lever k^2, which are cut at an angle to those in which the bar i^2 rests. This roller rests on the pile of sheets.

As the levers are vibrated the rubber i^2 acts on the top sheet of the pile to draw it from under the plate *y* and carry it backward, the sheet forming a bend or arch between it and the roller n^2. Although not absolutely necessary it is preferable, especially with poor quality of paper, to increase the distance between the bar i^2 and roller n^2 as they move backward, or, in other words, to accelerate the motion of the roller. To effect this the slot o^2 is cut at an angle to the slot j^2, so that, as the arms k^2 move back, the roller n^2 is forced up the slot, and its motion is thus accelerated. On each end of the roller n^2 is a lever, p^2, one end of which passes under the rubbing-bar i^2, the other end carrying the sliding weight q^2. By moving this weight along the arm the pressure with which the rubbing-bar presses on the sheets is regulated.

m^1 are arms secured on the shaft n^1. The outer ends of these arms are connected by the rod o^1, carrying the nippers p^1. From the platen is a projection carrying the roll q^1, which as the platen rocks acts against one of the arms m^1 to raise or lower the nippers which move between the platen and bed of the press.

r^2 are curved arms secured to the extremities of the shaft s^2, having bearings on the offsets t^2 from the frame. The upper extremities of the lever $s\ r^2$ are provided with roll u^2, acted on by the cam v^2 on the shaft I. To the lower ends of the levers r^2 are jointed the rods w^2, which extend upward and take the extremities of rod

x^2, carrying the delivery-nippers y^2. The rod x^2 is guided in the guide-slots z^2 on the upper part of the frame.

Both sets of nippers are constructed as follows, the upper pair being taken for description: On the rod x^2 is the sleeve a^3, which carries at its end contiguous to the frame an arm, b^3, from which a stud, c^3, projects into the slot z^2 in the frame. To the other extremity of the sleeve, situated about midway of the rod, is secured one jaw, d^3, of the nippers, and on the rod x^2 is the other jaw, e^3, the two working together, as shown, Fig. 2. The jaws are kept closed by the spring f^3, and are opened by the tappets g^3 h^3. The one g^3, acting on the head of the connecting-rod K, opens the jaw e^3 from the jaw d^3, which is held stationary by the arm b^3 in the slot z^2, and h^3 acting to hold the jaw stationary by coming against the stop-pin i^3, while the arm b^3 opens the jaws by its stud entering the bend in the upper end of the slot z^2. The lower or feeding nippers are similarly constructed to those just described. They are operated to grasp the sheet by a tappet, j^3, secured to the rod o^1, coming in contact with a projection, k^3, on the arm d^2, which opens them.

As the arm is lowered the nippers are closed on the sheet, and when in position to deliver the sheet to the upper or delivery nippers they are opened by the tappet j^3 coming in contact with the arm l^3, which is at the same time moved forward by cam J.

m^3 is the table on which the printed sheets are delivered and piled. It is situated above the feeding-table in an inclined position, as shown, Fig. 2.

n^3 are bars for supporting the rear edge of the pile, which bars form an angle with the table m^3. o^3 are guides projecting downward from the adjustable rod p^3 onto the table and parallel with the rear supports n^3. q^3 are side gages adjustable on the rod p^3.

The point at which the top edge of the sheet is held by the feeding-nippers p^1 to be taken by the delivery-nippers y^2 is fixed and invariable, while that at which the paper is held when the impression is taken may vary. This adjustment is effected by the supplemental arm r^3, which can be set down by the set-screw s^3, so that it shall project below the arm m^1.

The point t^3, Fig. 17, on the arm m^1, determines the position of the nippers p^1 when the sheet is taken by the delivery-nippers y^2, while the end of the arm r^3 will determine their position when the impression is given.

It is often desirable, in starting the press, to allow two or three revolutions to take place before feeding the paper. To effect this an arm, u^3, of the shape shown, Fig. 18, is pivoted to the side frame and provided with a stop-piece, v^3, which, when the arm is raised and supported on the catch x^3, extends across the slot z^2, and thereby prevents the delivery-nippers from descending.

The descent of the feeding-nippers is prevented by the stop w^3, projecting from the arm m^1 and resting on the arm u^3. The nippers thus retain the sheet for a succession of impressions, thus saving the tympan-sheet.

On referring to Figs. 12 and 16, it will be seen that the sleeve carrying the nippers p^1 is provided with a stop, 9, acting against the arm m^1, being kept against it by a spiral spring, x^4, wound around the sleeve, one extremity, 8, of which is fastened to the arm. The effect of this construction and arrangement is to make the nippers assume the position shown in Fig. 12 when they are at the upper end of their stroke—that is to say, their lower extremity stands off from the bed of the press. Now, as the platen approaches the bed to give the impression, it comes against these nippers and presses them in against the bed, as seen in dotted lines in Fig. 11, and as the platen recedes the spring x^4 throws out the nippers, thus stripping the sheet from the type.

I am aware that nippers have been used for stripping off sheets of paper from a form of type, but know of no instance in which they have been operated by the platen of the press, as just described.

The parts being constructed and arranged as described will operate as follows: The operation of the inking-rollers being generally well understood, the foregoing description will suffice to render it obvious. The platen being at its farthest point from the bed, the revolution of the shaft I in the direction of the arrow will commence to draw it to the bed. The stud m^2 on the platen-arms will then act against the horizontal limb of the lever k^2, and by the undulations thereon will impart a vibratory or laterally-reciprocating motion to the rubber bar i^2 and roller n^2. Each forward movement of this bar draws the top sheet of paper from under the plate y, and as the bar i^2 moves forward the plate y is elevated from the paper by the cam f^2 through the arm d^2, so that the sheet is each time returned under the plate until the nippers descend to take the sheet, when the plate y remains on the pile, and on the forward movement of the rubbing-bar the edge of the sheet passes over the beveled edge c^2 of the plate. The sheet is now in position to be taken by the feeding-nippers p^1, which descend as the platen opens by the action of the stud or roll q^1 on the platen. On arriving at the sheet the nippers grasp it, as before described, and the table i is depressed by the cam J, which thus leaves the sheet free to be taken away by the nippers, which, ascending as the platen closes to the bed, carry the sheet upward to the point where it is to be suspended for the impression, which having been accomplished the platen commences to open, and the delivery-nippers descend and seize the top edge of the sheet and hold it stationary, while the feeding-nippers rise above the edge of the sheet; then, by the contour of the lower extremity of the slot z^2 and the movement of the pitman-head K, on which the arm

g^3 rests, the nippers turn out or toward the platen to clear the sheet of the feeding-nippers p^1, which about this moment commence their descent, while the delivery-nippers ascend and carry the sheet to the delivery-table m^3, where it is deposited between the guides.

With some kinds of paper it is unnecessary to move the rubbing-bar backward more than once, that motion being sufficient to separate the sheet properly. To effect this the offset or undulations z^3 on the arm k^2 may be removed, and as under such conditions it will be unnecessary to elevate the plate y, the cam f^2 operating it may be thrown to one side of the roller on the arm d^2.

The press may be fed by hand by taking out the bar i^2, roller n^2, and bar u, the sheets being fed singly up to the stops y^4 on the plate y, Fig. 11.

I claim—

1. In a printing-press, the combination of a platen, C, bed B, mechanism, substantially as described, for separating the sheets from a pile of paper, and nippers for taking the sheet from the separating mechanism and suspending it between the bed and platen to receive the impression, constructed and operating substantially in the manner described and specified.

2. In combination with the bed and platen and the feed-board situated below said bed and platen, the nippers p^1, for taking the sheet from the feed-board, rising with and suspending it between the bed and platen, and the nippers y^2, for taking the sheet from the nippers p^1 and conveying it upward and to the piling-board m^3, constructed and operating substantially in the manner described and specified.

3. The combination of the separating mechanism, substantially as described, to separate the sheets from a pile, the nippers p^1, for taking the sheet so separated and suspending it between the platen and bed, and the nippers y^2, for taking the printed sheet from the nippers p^1 and carrying it to the piling-table m^3, constructed and operating substantially in the manner described and specified.

4. The method herein described of separating sheets of paper from a pile by clamping the front edge of the pile under a yielding clamp, substantially as described, and then with a frictional rubbing-bar acting on the top of the pile to draw the top sheet from under the clamp, and then raising the clamp and returning the sheet or sheets under said clamp for a repetition of the operation, whereby the perfect separation of the sheets is effected, substantially in the manner described and specified.

5. The combination of the levers k^2, rubbing-bar i^2, and roller n^2, situated behind said bar in the inclined slots in the levers k^2, constructed and operating substantially in the manner described and specified.

6. The combination of the bar W, rod V, roller U, tappets Y Y, and projections Z on shaft I, constructed and operating substantially in the manner described and specified.

7. The combination of the nippers p^1, arm m^1, arm r^3, adjusting-screw s^3, and projection from the platen q^1, constructed and operating substantially in the manner described and specified, for adjusting the position of the nippers p^1 when the impression is taken.

8. The combination of the arm u^3, arm m^1, provided with projection w^3, nippers p^1, and catch x^3, for arresting the descent of the nippers, constructed and operating substantially in the manner described and specified.

9. The combination, with the delivery-nippers and their shaft running in the slot z^2, of the arm u^3, provided with projection v^3 and catch x^3, constructed and operating substantially in the manner described and specified.

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Witnesses:
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