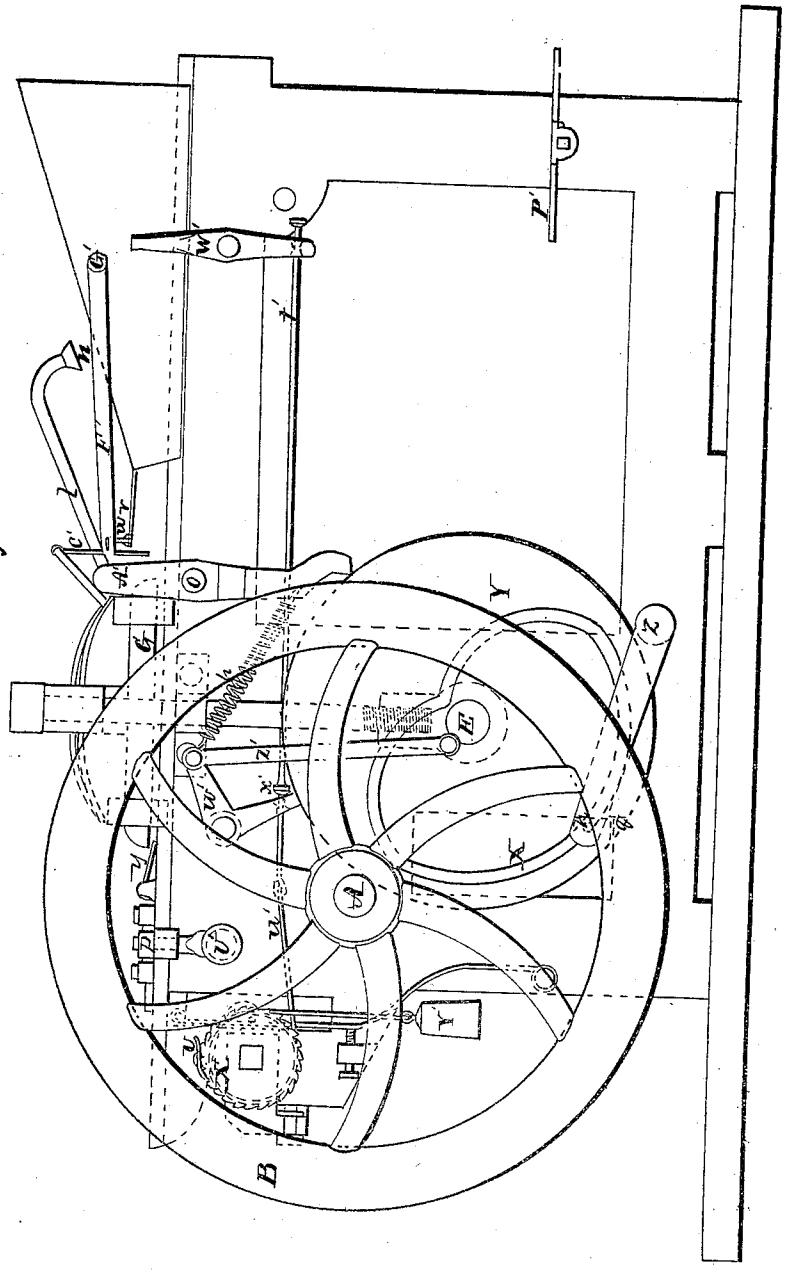
Sheet 1. 4 Sheets.

S. P. Ruggles.
Printing Press.

No. 9410. Patented Nov. 10. 1852.

Fig. 1.



Sheet 2. 4 Sheets.

S. P. Ruggles.

Printing Press.

No. 9410. Patented Nov. 16. 1852

Fig. 2.

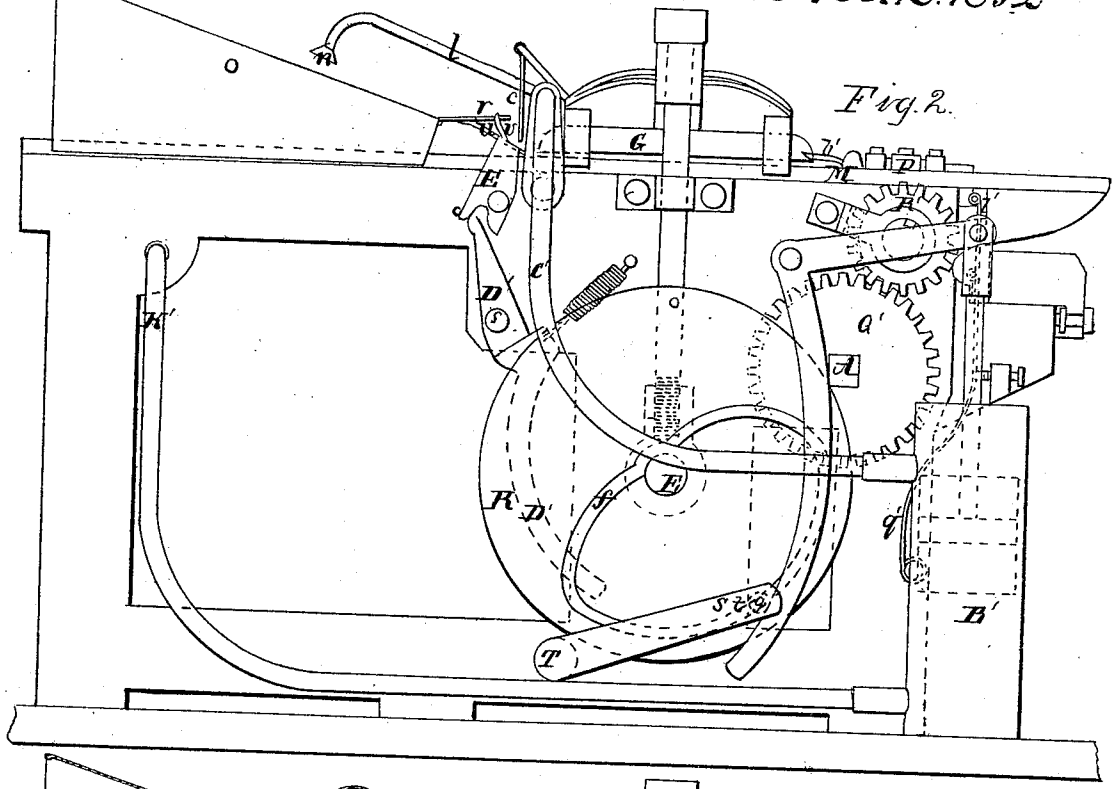
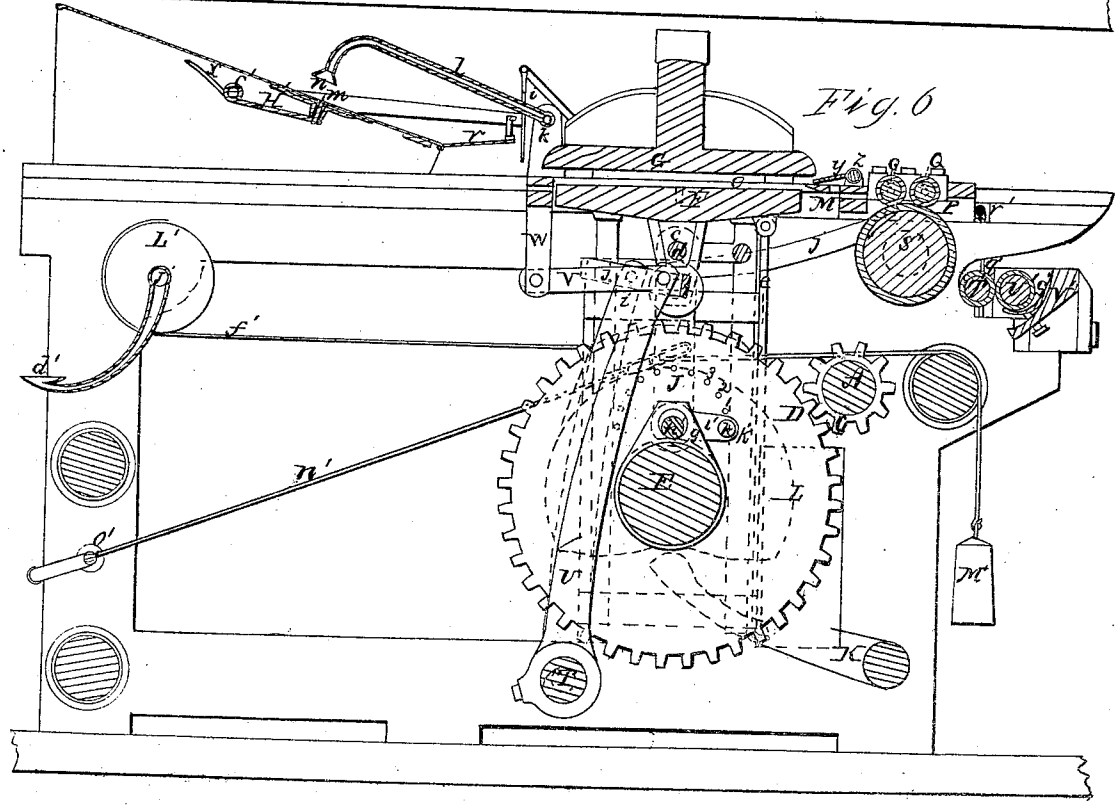


Fig. 6



Sheet 3. 4 Sheets

S. P. Ruggles.

Printing Press.

No. 9410. Patented Nov. 16. 1852.

Fig. 3.

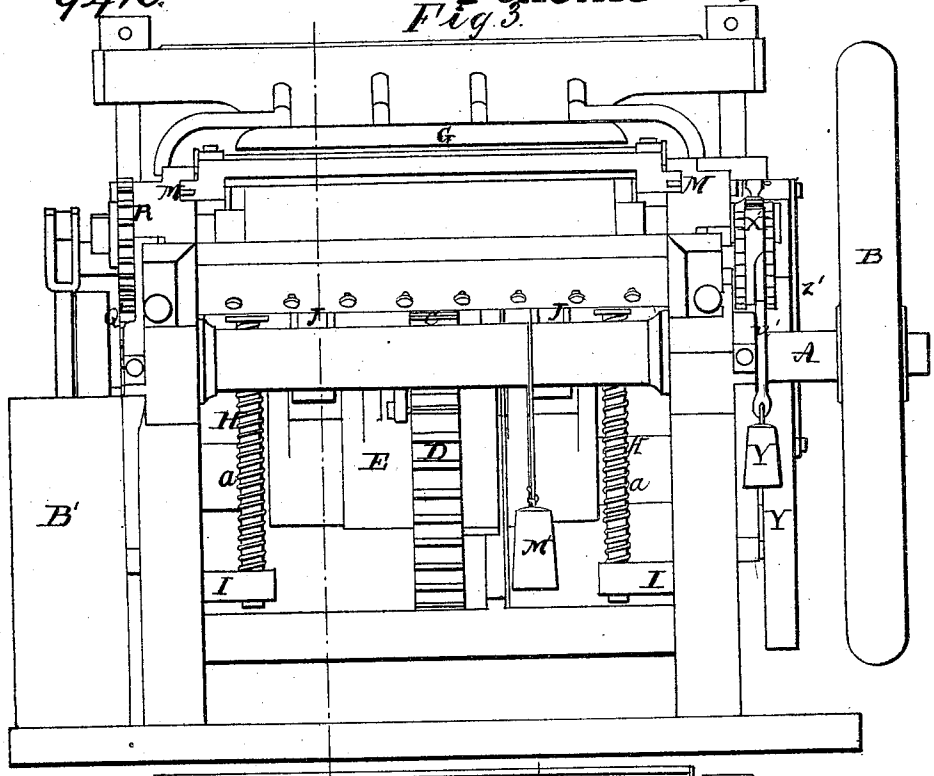
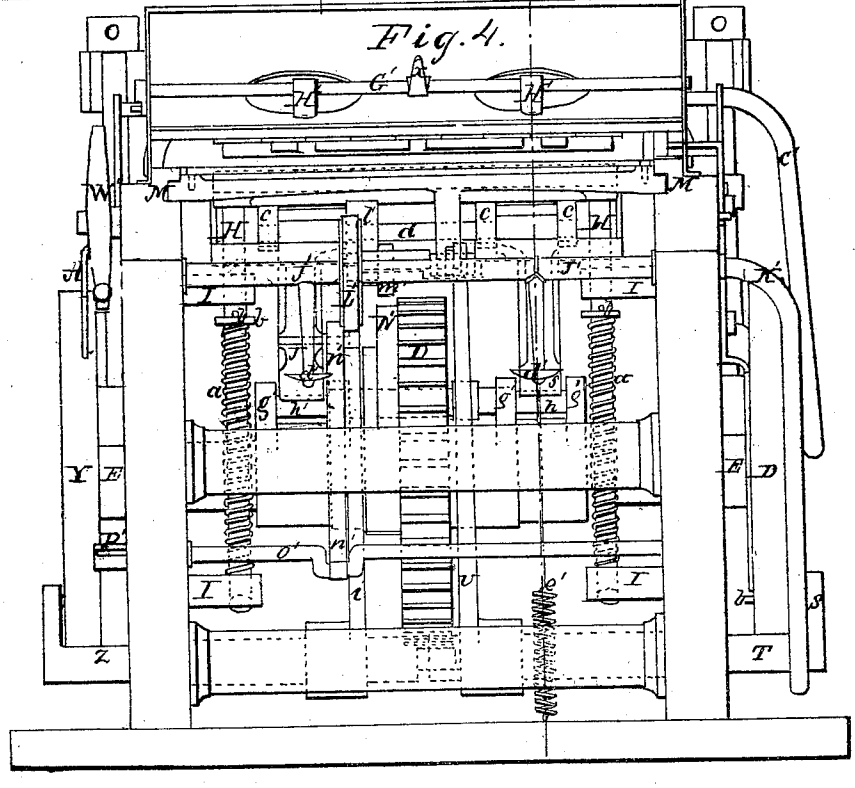


Fig. 4.



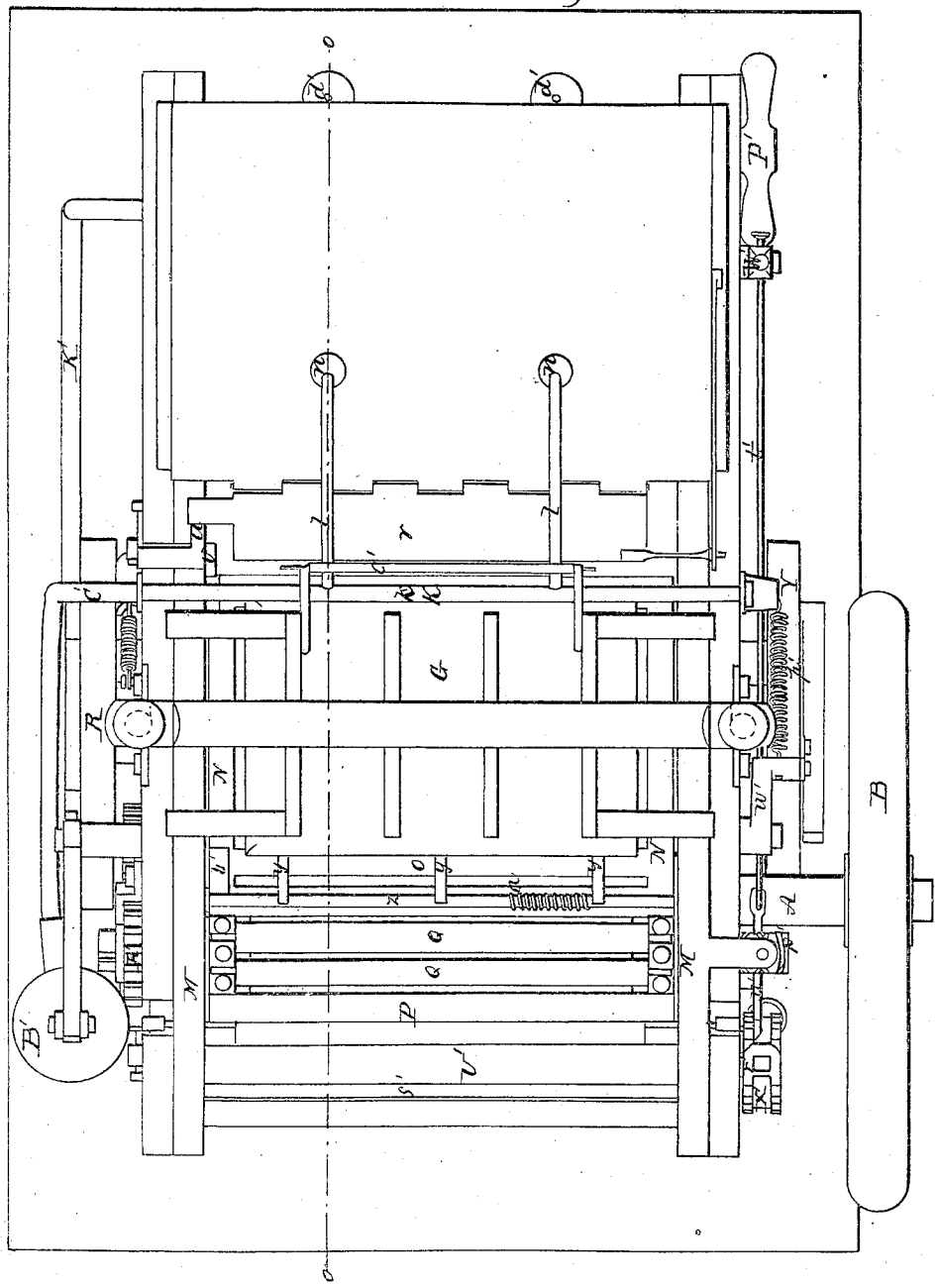
Sheet 4. 4 Sheets.

S. P. Ruggles.

Printing Press.

No. 9410. Patented Nov. 16. 1852

Fig. 5.



UNITED STATES PATENT OFFICE.

STEPHEN P. RUGGLES, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PRINTING-PRESSES.

Specification forming part of Letters Patent No. 9,410, dated November 16, 1852.

To all whom it may concern:

Be it known that I, STEPHEN P. RUGGLES, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Book-Printing Presses; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part thereof, in which—

Figure 1 represents a view of one of the sides of the press. Fig. 2 represents a view of the opposite side from Fig. 1. Fig. 3 represents a view of the rear end of the press. Fig. 4 represents a view from the front end of the press. Fig. 5 represents a top view, and Fig. 6 a longitudinal vertical section through the red line *0 0* of Fig. 5.

Similar letters in the several figures represent the same parts.

The nature of my invention consists, first, in so hanging the bed which carries the form of type, and which rises and falls for each impression taken, upon springs as that the weight of the bed, which is several hundred pounds, and the elasticity of the springs will be sufficient to overcome about three-fourths (more or less) of the motion in falling and rising, the remaining distance being overcome by cam attachments, which come into operation just before and after the weight of the bed and the springs cease to operate, thus making the bed itself by its weight and the springs by their elasticity overcome all the inertia in starting it from a state of rest and completing the motion by cam attachments at the extremes of the motion or vibration of the bed, which take hold and let go at the proper time for effecting this purpose, by which means the press is worked with more easd ane without the least perceptible jar; second, the arranging of the inking-rollers and the frisket on separate carriages on the same ways and moving at such relative velocities as that the frisket may remove the sheet from the form quickly, while the inking-rollers may travel more slowly, and so that the inking-rollers may return to the ink-trough after inking the form without awaiting the return of the frisket, by this arrangement doing better inking and saving the time required both in delivering and receiving the paper on the frisket and that which would be consumed in raising and lowering the bed, which could not be commenced until the printing-rollers and frisket, if attached together, had performed their functions; third, pointing the sheet by an automatic movement attached to some moving part of the press while it is being prepared for receiving its first impression, by which means the operator can with both hands hold and control the sheet for the nippers without letting go the sheet to point or press the paper upon the pointing-pins, as heretofore done; fourth, in having a blast of air to blow upon the sheet when it is being arranged for receiving the impression on the reverse side, which will blow the sheet against the points, leaving the operator the free use of both his hands to guide and control the sheet, the blast being sufficient to force the paper onto the points whenever the register in the sheet is brought directly over them, thus performing to a great extent by an automatic attachment what has heretofore been accomplished entirely by hand; fifth, the removing of the printed sheet by means of "fly-feet" or inverted cups, which come down upon the sheet, and from which the air is exhausted, thus making the sheet adhere to them by atmospheric pressure. The cups may be arranged on hollow arms on a hollow shaft, so that the paper may be drawn off, turned over, and laid upon the paper-table in proper position for being again passed through the press; and the adjustability of the registering-points, so that they may be made to conform to the unequal shrinking of the paper after it has been moistened or as it is gradually drying, and the method of regulating the inking apparatus at any time during the operation of the press, and the eccentric pin or shaft operating in connection with a pitman for regulating the distance between the platen and the bed.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The frame of the press may be made, in any well-known substantial manner, of metal, wood, or both combined, and in suitable bearings therein may be placed the shaft A, upon which the balance-wheel B is arranged, and through which shaft power of any kind may be applied for the driving of the press. On

the center of the shaft A is placed a spur-wheel C, which meshes into a cog-wheel D, arranged on a shaft E immediately under the bed of the press. The bed F, which carries the form, may be a solid metallic plate of sufficient solidity for the purpose, and is moved up and down vertically to the platen G, which is stationary. The bed is balanced on four guide-rods H, which pass through stout projections I, cast on the frame, and between said projections are arranged helical springs *a*, coiled around the rods H, their lower ends resting on the lower projections and their upper ends bearing against a collar *b* on the said rods. On the bottom of the bed are cast the lugs *c*, through holes in which passes a rod *d*, upon which are suspended the arms or pitmen J, which hang down sufficiently far to be caught by an adjustable eccentric on the shaft E (to be hereinafter described) and form with it a loose toggle-joint, which raises up the bed for the impression and is then immediately detached, so as to allow the bed to fall back upon the helical springs by its own weight, which compresses the springs sufficiently to allow it to sink the larger portion of the required distance, and at this point the rod *e*, Fig. 6, which is also attached to the bed and is operated by a cam-lever K, to which it is also atttached, completes the descending operation by drawing down the bed and compressing the springs, and in which position it is held by an eccentric L, (shown in dotted lines, Fig. 6,) which holds down the said cam-lever K until the bed is again ready to rise, when the eccentric L suddenly releases the cam-lever, and the helical springs, by their relaxing, forces up the bed nearly three-fourths of the distance, and before its motion ceases it is caught and carried up the remaining distance by the adjustable eccentric on the shaft E coming against the arms J, before described, which completes the upward motion. By this arrangement it will be perceived that the inertia of the bed, which weighs ordinarily several hundred pounds, is overcome by its own weight in descending, when it is caught upon coiled or other springs and the motion completed by drawing it while still in motion farther down upon the springs, and then for the ascending motion the elasticity of the springs starts it quickly upward, and before it comes to a state of rest it is still farther carried up by the toggle-joint, the principle operating similarly to the method of applying the power to keep a pendulum in motion at or near the termination of its vibration instead of at the point where it would be in a state of rest. The press thus arranged requires much less power to drive it and runs perfectly smooth without the least jar or noise, and more particularly when operated by hand it relieves the operator from starting the bed, which is necessarily heavy, from a state of rest, the power to operate it being always applied while it is in motion.

In book-presses as heretofore constructed the inking-rollers and frisket have been arranged in the same carriage and consequently travel at the same velocities, the one being made to depend upon the motions of the other. This involves not only loss of time but the quality of the work. There is no obstruction to the removing of the frisket at the very moment the impression is taken; but when the inking-rollers are attached to the frisket time must be given to allow the form to fall sufficiently far to receive the inking-rollers before the frisket can move, and when it does move it travels too fast to allow the rollers to do regular inking. So, also, on the return the inking-rollers must remain idle while the frisket is delivering the printed sheet and taking on a fresh one, and to economize time too much rapidity must be given also to the return-motion. The consequence is that the inking is badly done or time wasted.

I have arranged the frisket and inking-rollers on separate carriages moving on the same ways with such relative velocities as to work in harmony with each other, giving the frisket a quick motion in carrying off the printed and returning with the fresh sheet, and while it is at rest in delivering one sheet and receiving another the inking-rollers are taking up the whole time in inking the form, by which means no time is lost and perfect inking is done.

M represents the ways upon which the carriages N, carrying the frisket O, Fig. 5, and P, carrying the inking-rollers Q, travel. The carriage N is driven by the cam-groove *f*, cut in the wheel R, Fig. 2, in which a pin *g*, set in the end of the arm S, which is attached to the rock-shaft T, operates, the wheel R being attached to and receiving its motion from the shaft E, before described. On the rock-shaft T is arranged a curved arm U, rising up to a point underneath the bed, and to the top of said arm is hinged a horizontal connecting rod or bar V, which has its other end hinged to a projection W on the front end of the frisket, the whole being so arranged that as the shaft T is rocked by the operation of the cam-groove, pin, &c., the frisket runs forward, remains stationary, and then returns and remains stationary at suitable intervals for each successive operation which it has to perform. The carriage P, for carrying the inking rollers Q, is moved by the cam-groove X, cut in the wheel Y, Fig. 1, which is placed on the opposite end of the shaft E from that of the wheel which moves the frisket. There is a small pin *h*, which is attached to an arm on the shaft Z, which runs in the said cam-groove X, and which gives to the shaft a rocking motion. On the shaft Z is arranged a curved arm *i*, which is attached to a bar *j*, connected with the carriage P, and which moves the said carriage back and forth at proper intervals, it moving much slower than the carriage to which the frisket is attached, but with such relative motion as not to inter-

fere at any time with the motions or functions of each other. The rock-shafts T and Z, for operating the two carriages, are in line with each other and have their outer bearings in the frame of the press, and where they meet one shaft may have a step cut therein and the other a journal to fit into the step, so that they shall support each other. They may, however, have separate bearings in the center of the press.

It has been universally the custom heretofore for the operator in laying on the sheets to be printed so let go of the sheet with one of his hands, while with the other he reaches forward to pat down the sheet on the points which register it for the printing on the reverse side, and in the pointing of very large sheets it required two persons to perform this duty—one on each side of the press. I accomplish this by an automatic movement, while the operator may use both his hands to guide and control the sheet. I arrange across the top of the press a hollow shaft or tube *k*, from which project two curved hollow arms *l l*, turned down at their extreme ends, so as to stand immediately over the registering-points *m*, Fig. 6, and finished with trumpet-mouths *n n*. To one end of this hollow shaft is attached a lever A′, Fig. 1, which is hinged near its middle to the frame by a pin or screw *o*, upon which it may swing. Upon the lower end of the lever A′ is a cam projection, which rests upon the periphery of the wheel Y and is kept there by a helical spring *p* while the said wheel rotates, and in said wheel is cut a depression *q*, into which the lever is drawn by the spring *p* when they come opposite to each other. This throws the upper end of the lever forward, bringing the arms *l l* down upon the paper, pressing it onto the points, after which they immediately rise and the points fall back through the paper-table until required for the succeeding operation.

I have described the shaft *k* and arms *l l* as being hollow. It is not necessary for the pointing or registering of the sheets that they should be so, as they would accomplish the same result if solid; but for the purpose of placing the sheet properly on the registering-points *m* for the impression on the last side I cause these parts to perform another operation.

As above stated in regard to the first placing of the sheet, the same difficulty is encountered in placing the sheet on the points for the impression on the opposite side, viz: The operator after placing the sheet near its proper position must let go with one hand, while with the other he feels for and presses the sheet onto the registering-points, and, as in the former case, when the sheets are large it requires two persons to perform this duty. By my arrangement I cause this operation to be performed automatically, while the operator holds and controls the sheet with both hands, as follows: I attach a small air-pump B′ in such position as to be operated by any of the moving parts of the press and attach thereto a flexible or other tube C′, which connects with the hollow shaft *k*, before described. The motion of the pump may be so regulated that when the operator places the sheet near its precise position the blast of air through the tube or pipe C′, shaft *k*, and hollow arms *l l* will gently press the sheet against the points *m*, while the operator can perceive the break of the paper over the point and moves the previously made register to fit the said point, and when it comes over the point the blast will press it down in its proper place. If found expedient but one of the arms *l* may be used for this purpose, for when one of the registers is in place the sheet may be readily swung around by hand and placed on the other, the first one acting as a guide for the other. It might be proper here to state that when the first side is being printed the blast is shut off by a stop-cock or otherwise, it not being required, and when the second or reverse side is being printed the blast is let on and the helical spring *p*, attached to the lever A′, should be loosened or the lever otherwise thrown out of gear, so that the shaft *k* and arms *l l* may remain stationary. The points *m* are made adjustable by passing them through a friction-plate underneath the paper-table, as seen at Fig. 6, so that if the paper should shrink irregularly on either of its sides after being moistened and when printing the reverse side the operator may adjust the point to the register and still do perfect work. They are also caused to rise up and sink down at proper intervals by the rising and falling of the hinged part *r* of the paper-table, as follows: On the inside face of the wheel R, Fig. 2, is placed a pin *t*, (shown in dotted lines,) which as the wheel rotates, comes in contact with the curved lever D′, which is hung to the frame by a pin *s*. The upper end of the lever D′ is rounded off and fits into and forms a toggle-joint with the branched end of a vibrating arm E′, which carries two cam projections *u v*, one of which *u* passes underneath the hinged portion *r* of the paper-table and raises it up. On the end of the hinged portion *r* is an arm *w*, Fig. 1, which passes into an eye in the end of an arm F′, which is attached to a shaft G′, Fig. 4, passing underneath the paper-table. On the shaft G′ are placed two arms H′ H′, Fig. 4, (also seen in section, Fig. 2,) which carry the registering-points *m*. The arm F′ and the arms H′ H′ being attached to the same shaft and about parallel with each other, their motions correspond with the rising and falling motion of the hinged portion *r*, bringing the points up to mark the register and then immediately fall to allow the sheet to be drawn in by the nippers. There is also on the shaft G′ a projection *x*, Figs. 4 and 6, which comes up against the under side of the paper-table and prevents the hinged part *r* from falling too low. The cam projection *v* on the vibrating arm

E′ is arranged for the purpose of raising up the nippers *y y*, Figs. 1, 5, and 6, which is accomplished as follows: The nippers are permanently fixed on a rock-shaft Z, around which is coiled a helical spring *a′*, Fig. 5, and which shaft is attached to the rear of and travels with the frisket-carriage. On the end of the rock-shaft Z is placed a cam projection *b′*, Figs. 2 and 5, which as the frisket runs forward catches on the cam projection *v*, and by it is raised up, rotating the shaft Z and raising the fingers or nippers *y y* upon it, and also winds up the spring *a′*. The nippers protrude through openings in the stationary paper-gage *c′*, which is attached to the platen, and when the pin *t*, Fig. 2, strikes the bent lever D′, which throws forward the upper part of the arm E′, it lowers the cams *u v* on said arm, allowing the hinged portion *r* of the paper-table to fall and let down the end of the sheet onto the frisket, which was before resting against the stationary paper-gage *c′*, and the moment the end of the sheet drops the nippers, which were before held up by the cam *v*, are drawn down by the uncoiling of the spring *a′* on the shaft Z and seizes the end of the sheet, holding it on the frisket, when it is drawn in immediately under the platen and over the form to be printed. With the falling of the hinged portion *r* of the paper-table the registering-points *m*, as above described, also drop, so as to present no obstacle to the free passage of the sheet.

The method of delivering the sheet from the press is as follows: At the front, or that end of the press from which the sheets are fed or carried in to the form to be printed and underneath the paper-table, I arrange in proper bearings a hollow shaft J′, which is connected by a flexible tube K′ with the air-pump B′, and on the said shaft I arrange one, two, or more curved hollow arms with concave terminations *d′*, which I term "fly-feet." To this shaft I attach a cord and helical spring *e′*, and a drum or pulley L′, around which is passed and secured by one end an elastic band *f′*, the other end of which is attached to the lever *i*, which operates the carriage carrying the inking-rollers. When the inking-rollers are drawn forward to ink the form, which takes the strain off from the cord *f′*, the helical spring *e′*, which is then drawn out, contracts, rotating the shaft J′, which brings the fly-feet *d′*, with its cups or concaves inverted, upon the sheet lying on the frisket. At this precise moment the movement of the air-pump is so timed as to exhaust the air from under the fly-feet, and the sheet is held by atmospheric pressure against them. The frisket and inking-rollers also then move back, and by unwinding the cord *f′* from the pulley L′ it turns the shaft, causing the fly-feet to perform half a revolution, carrying the sheet with them until near the termination of their movement, when the air-pump reverses and the sheet is released and laid upon a table with the printed side up, (it having been turned over in its passage) ready for being printed on the reverse side. The helical spring, having been drawn out by this movement, is again ready as soon as the shaft is released by the cord to perform the next similar operation. The sheet is thus delivered printed at the same end of the press and underneath the table from where it was fed in, the hinged portion of the table when up admitting of the frisket freely passing underneath it. On the shaft E, Fig. 6, are arranged the projections or lugs *g′*, through which pass an adjustable alternately concentric and eccentric shaft *h′*, the eccentric portions of which rest in the lugs *g′* and the concentric portions form, with the arms or pitmen J, before described, a loose toggle-joint when the impression is to be taken, and as soon as taken the toggle-joint is separated and the bed is free to sink gradually onto the helical springs *a a*. On the shaft *h′* is attached an arm *i′*, having a set-screw *k′* therein, which may be turned and screwed into either of the holes 1 2 3, &c., in the wheel D, as it may be required to adjust or regulate the form or bed to the platen or the platen to the bed, as the case may be, the object being to increase or diminish the space between them. It will be perceived that by turning the shaft, the eccentric portions of which only are in the bearings that portion of it which forms with the arms or pitmen J the toggle may be raised or lowered, so as to raise up farther or less the bed carrying the form. This adjustment may to a very great extent be only required when replacing the blankets upon the platen or for some wear of the press and makes it susceptible of the very nicest adjustment, but can be used for regulating the distance between the platen and the bed. There is a cord and weight M′ attached to the arms J, so that the moment the shaft *h′* leaves the rounded ends of these arms they are immediately drawn out of the way sufficiently far to allow the bed to come down and remain in the exact proper position to be again caught by the shaft *h′* when it comes around for the next operation. Just before the shaft and arms separate the weight of the bed is taken from them by a friction-roller *m′*, which is attached to a projection *l′* on the bottom of the bed, and which roller is caught on or by a cam N′ on the cog-wheel D, and as it continues to turn the whole weight of the bed is let onto the springs, as before described. There is also attached to the arms J a rod *n′*, which is fastened by its other end to a crank-shaft O′, placed in a convenient position for the operator, said shaft having a foot-piece P′ upon its end, so that in case of accident, or if the sheets should not properly run in or out by stepping upon the foot-piece, the arms J will be swung or thrown so far forward as to not be caught by the shaft or wrist *h′*, and consequently the impression is thrown off. On the extreme end of the shaft A, which carries the

fly-wheel, I arrange a cog-wheel Q′, which meshes into a spur-wheel R′, placed on one end of the distributing-roller S′, the journal of the other end of said roller being provided with a double screw p', into which works a stationary pin, so as to give the said roller a reciprocating motion at the same time that it receives a rotary motion from the cogged gearing Q′ R′ for the purpose of working and more equally distributing the ink. The roller S′ is supplied with ink by the small roller T′, which is hung in spring-arms q' to the frame, and which said small roller is forced back against the grooved roller U′ in the ink-trough V′ by means of the carriage P, which strikes against pins r' on each of the spring-arms q', carrying back the roller T′ against the roller U′, which at that precise moment rotates sufficiently to supply the necessary quantity of ink, and when the carriage P runs forward over the form the spring-arms, being released, carry the roller T′ against the roller S′, furnishing it with the ink, which is in turn transmitted to the inking-rollers Q in the carriage P. The roller U′ in the ink-trough may have upon its face a series of small grooves, and an adjustable scraper s' is so arranged in the trough as to scrape off all the ink from the roller U′, except so much as shall be contained in the grooves, which gives a smooth even quantity and can be readily adjusted to any desired supply. It will be obvious that instead of the grooves in the roller U′ the scraper s' may be provided on its edge with fine teeth, which will scrape off the ink, leaving only so much on the roller as shall pass between said teeth. The supply of ink carried up from the ink-trough is regulated by the amount of rotary motion given to the roller U′, which should be so arranged as to be convenient to the operator and so that he may regulate it as the impressions may seem to require, and for this purpose I arrange as follows: At that part of the press where the operator stands I arrange a hand-lever W′, through which is passed the end of a rod t', which extends toward the rear of the press, and to its end is attached a strap or cord u', which passes around a pulley X′, arranged on the end of the roller U′, which works in the ink-trough. On the periphery of said pulley X′ (a groove being cut in its center for the strap or cord to work in) is cut a ratch, into which plays a pawl v', attached to said strap, there being on the end of the strap a weight Y′, which, whenever the strap is loosened, draws forward the pawl onto the ratch. On the wheel Y, Fig. 1, is attached an arm Z′, which is fastened to one arm of bent lever w', fixed on the frame, and through the other arm of the bent lever w' passes the rod t', it being provided with a stop x', against which the arm comes. As the bent lever is vibrated by the rotation of the wheel Y and arm Z′ the roller is moved periodically in one direction, the pawl slipping back by the weight attached to the strap, as before described. By moving the hand-lever W′ to the left it brings the stop x' on the rod t' farther from the bent lever, and consequently it does not rotate the roller so much. By this arrangement of parts the operator may adjust at each impression, so as to get the precise quantity of ink and the exact impression desired.

There are many of the details of this press which I have not described—for instance, the parts for operating the air-pump, the method of putting on and adjusting the platen, and others which would make the description unnecessarily long; but all of these parts are clearly shown in the drawings and may be varied to suit circumstances. I have, however, shown one method of performing each and every operation and may alter them for better arrangements so long as I retain the general principles of my invention.

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

1. So hanging or balancing the bed which holds the form and moves up and down for each impression upon springs as that its own weight shall compress the springs to a great extent and the entire compression of them be completed by drawing the bed farther down while in motion, and so that the elasticity of the springs when the bed is to rise will raise it up to the extent of their power and the upward motion be completed by a separate arrangement while in motion for the purpose of relieving the machine from overcoming the inertia in moving the bed from a state of rest, the power to complete its motion being applied near the termination of its movement, substantially as described.

2. The arranging of the frisket and the inking-rollers in separate carriages moving on the same ways with such relative velocities as not to interfere with each other and so that the frisket may carry off and bring back the sheet quickly, while the inking-rollers may travel more slowly and do more perfect work, substantially as described.

3. The pointing of the sheet while being prepared for receiving the first impression by an automatic movement attached to some moving portion of the press and so that the operator may use both his hands in guiding and controlling the sheet.

4. The application of a blast of air or its equivalent for the purpose of forcing the sheets upon the registering-points when the paper is being prepared for the reverse impression, so that the operator may use both his hands in guiding and controlling the sheet.

5. The removing of the sheet from the frisket or from the press by means of atmospheric pressure applied in the manner herein described or its equivalent, for the purpose of turning over the sheet in its delivery, substantially as described.

6. Making the registering-point adjustable in the paper-table by passing it through

a friction-plate secured between two plates and so that it may be moved in any direction by a slight tap for the purpose of allowing for the unequal shrinking or drying of the paper or any movement of the form after the first impression is taken, substantially as herein described.

7. The combination of the open toggle and adjustable eccentric shaft or pin which operates the bed for the purpose of regulating the impression by increasing or diminishing the distance between the bed and platen, substantially as described.

STEPHEN P. RUGGLES.

Witnesses:
F. O. PRINCE,
J. C. CROSMAN.