R. M. Hoe. Sheet 1. 5 Sheets.

Printing Press.

No. 5,188. Patented Jul. 10, 1847.

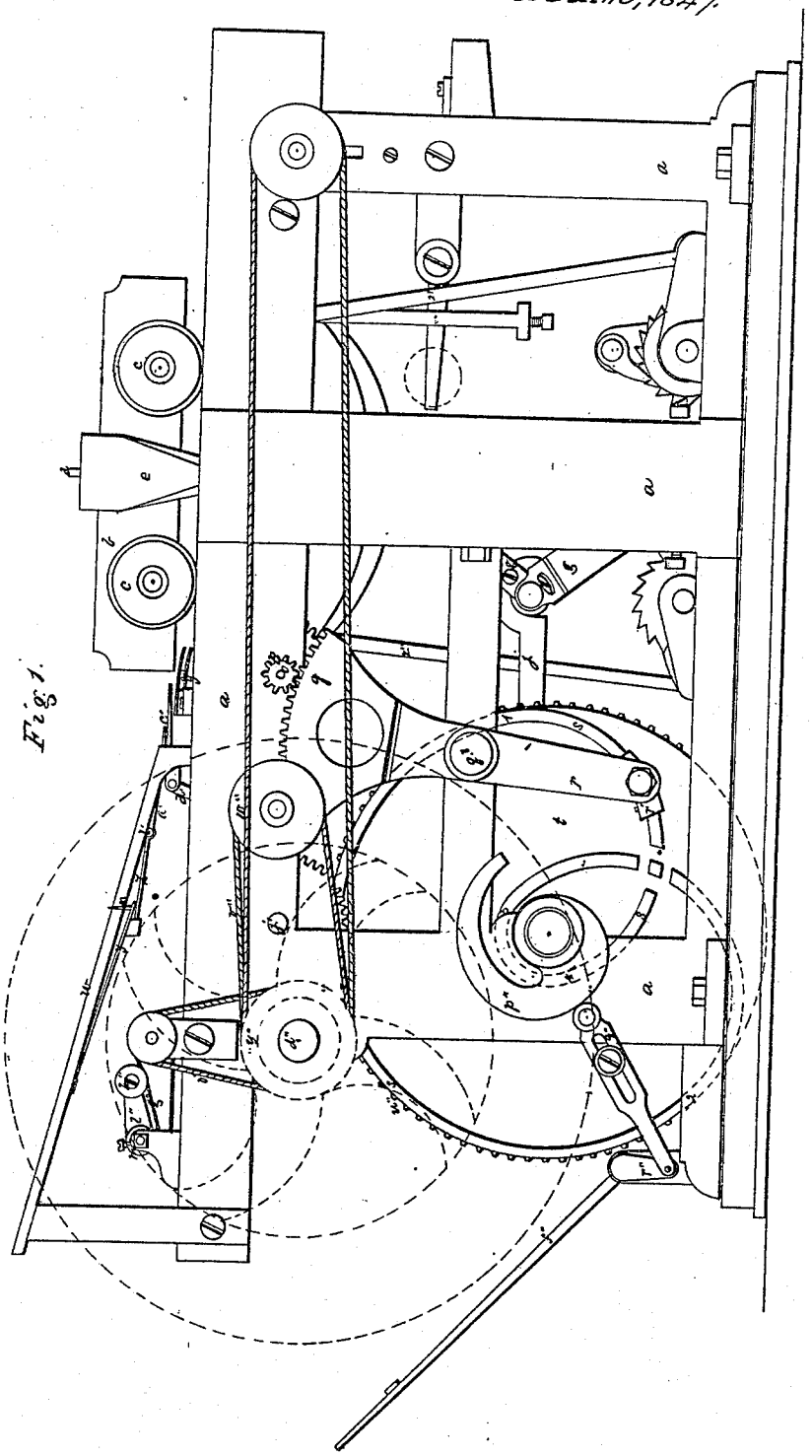


Fig. 1.

R. M. Hoe Sheets. 5 Sheets.

Printing Press.

No. 5,188. Patented Jul. 10, 1847.

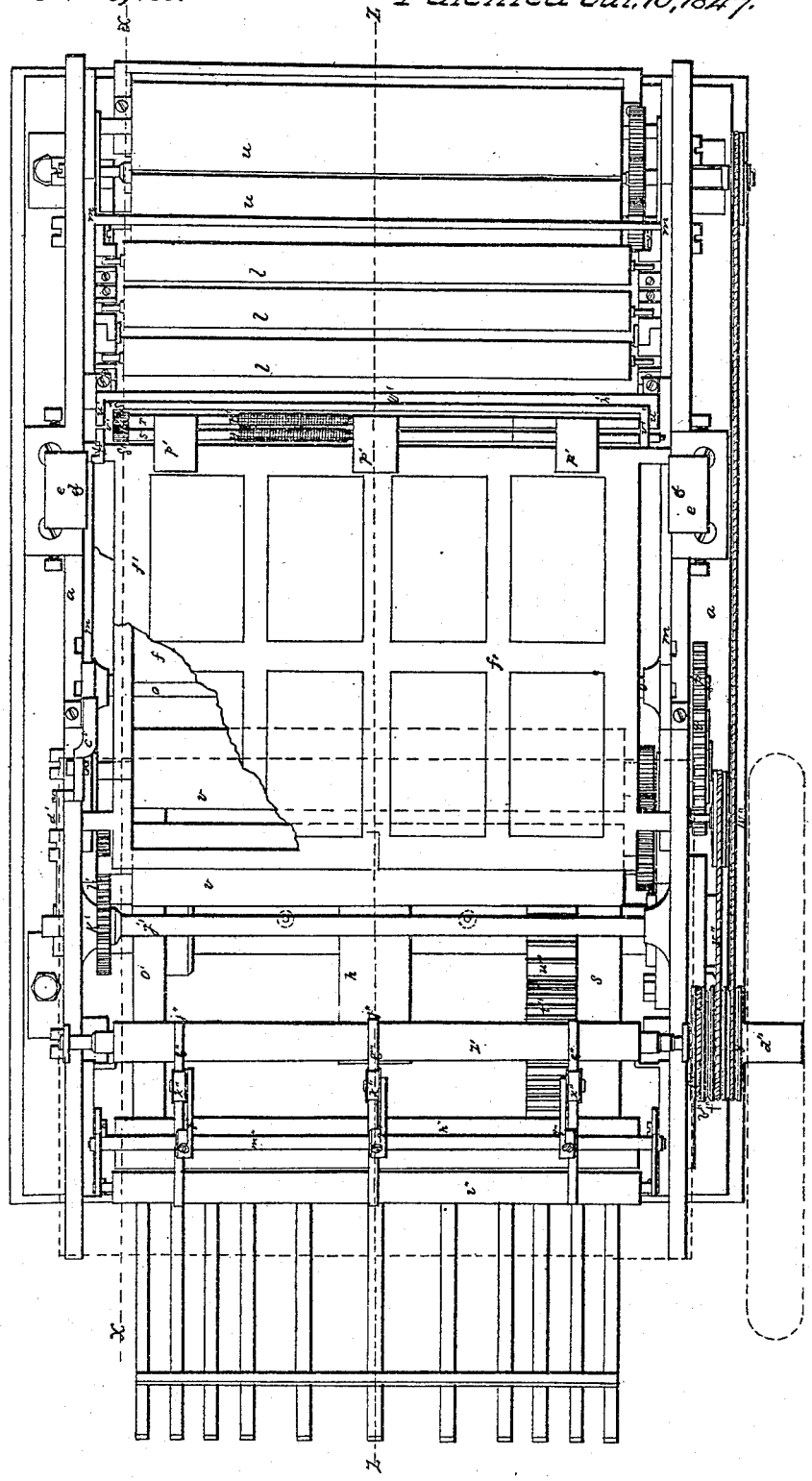


Fig. 2.

R. M. Hoe. Sheet 3. 5 Sheets.

Printing Press.

No. 5,188. Patented Jul. 10, 1847.

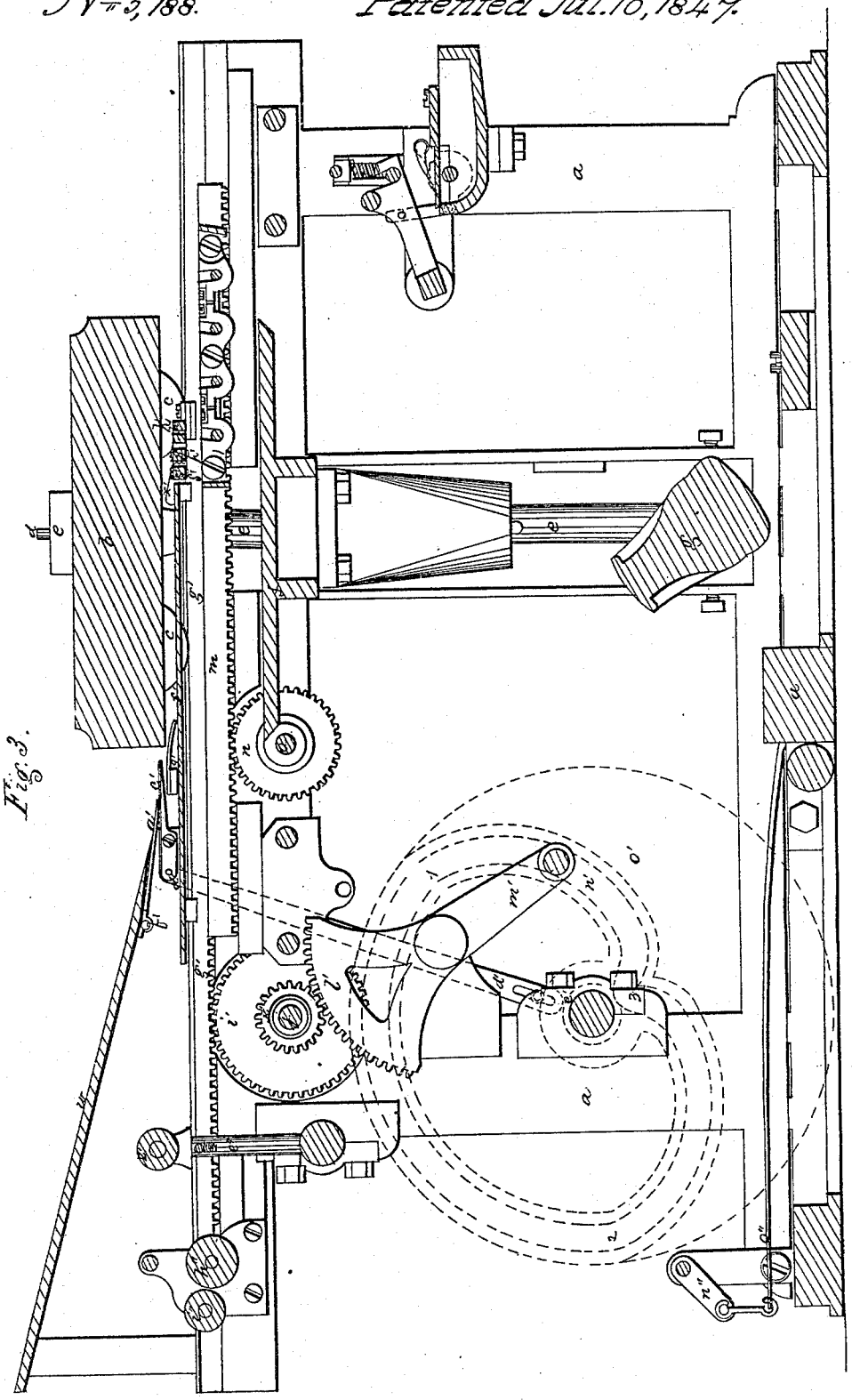


Fig. 3.

R. M. Hoe Sheet 4. 5 Sheets.

Printing Press.

No. 5,188. Patented Jul. 10, 1847.

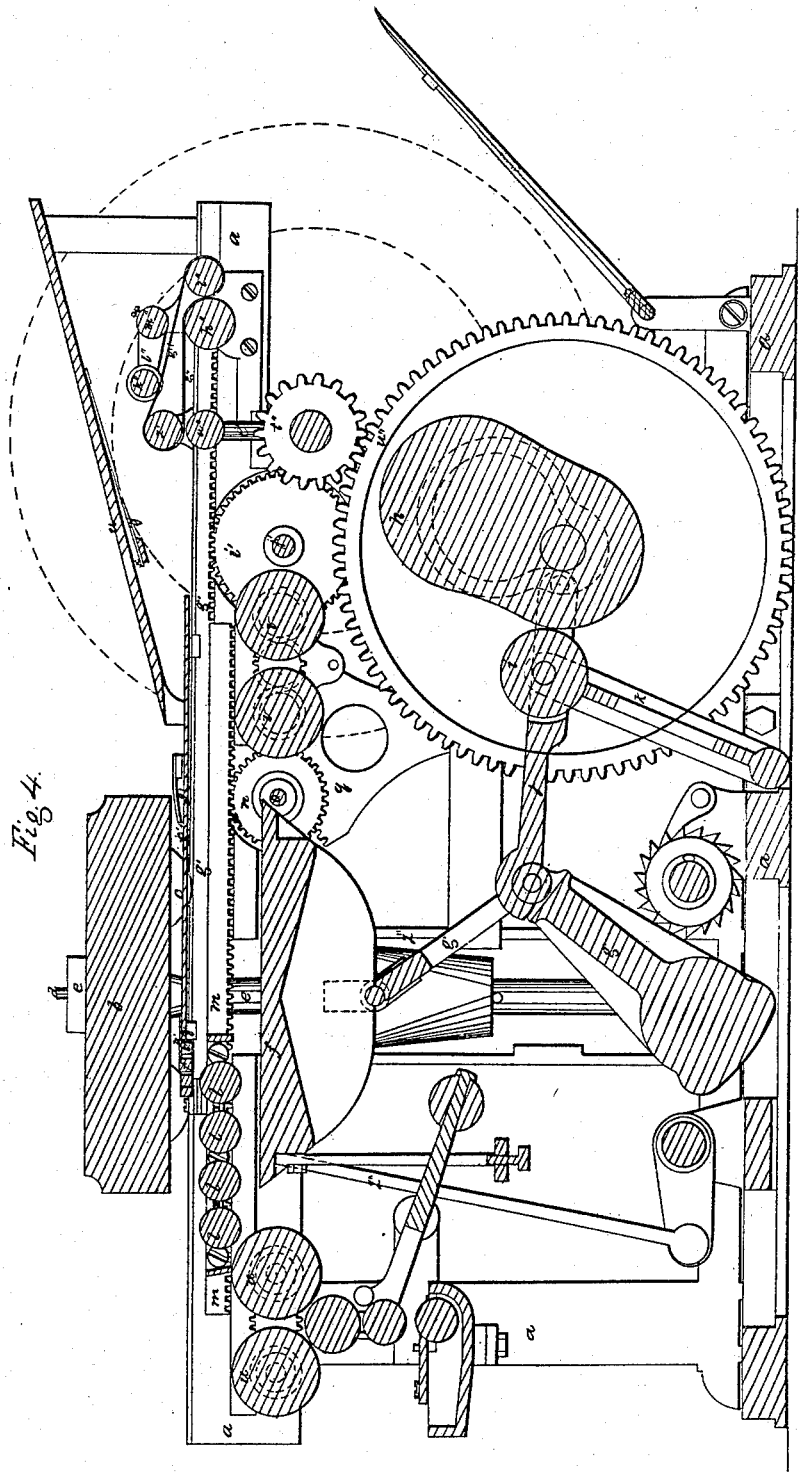


Fig. 4.

R. M. Hoe. Sheet 5. 5 Sheets.

Printing Press.

No. 5,188. Patented Jul. 10, 1847.

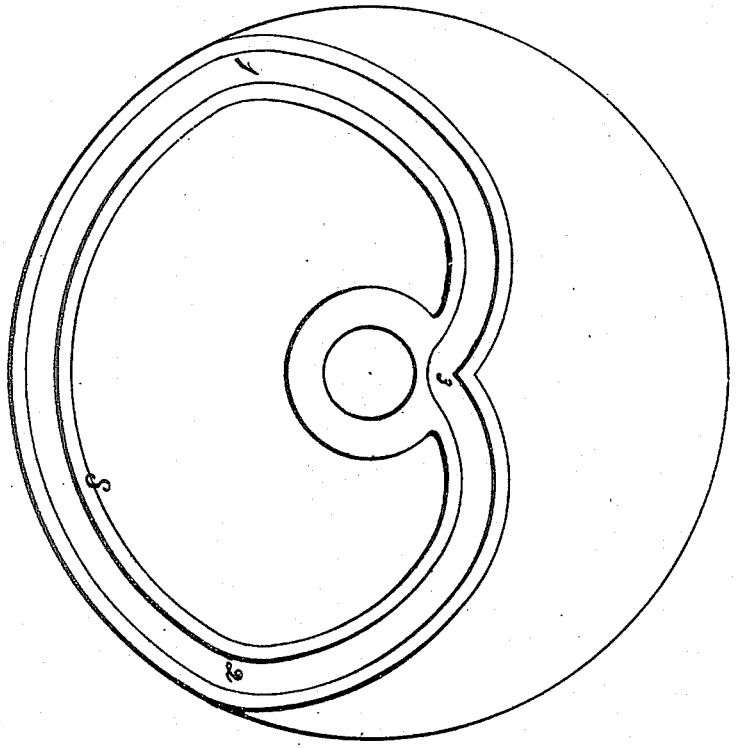
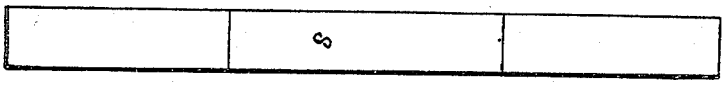


Fig. 3.



UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN PRINTING-PRESSES.

Specification forming part of Letters Patent No. **5,188**, dated July 10, 1847.

To all whom it may concern:

Be it known that I, RICHARD M. HOE, of the city, county, and State of New York, have invented new and useful Improvements in Bed and Platen Printing-Presses; and I do hereby declare that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation of the right-hand side of the press; Fig. 2, a plan; Fig. 3, a longitudinal vertical section taken at the line X X of Fig. 2, and Fig. 4 a like section taken at the line Z Z of the same figure.

The same letters indicate like parts in all the figures.

The nature of the first part of my invention consists in operating the sliding frame that carries the inking-rollers over the form of types by a motion independent of that which operates the frame that carries the frisket and finger-bars, so that by a simple change of the cam that gives the motions to the inking-rollers they can be passed over the form of types once or twice for each impression, once being sufficient for inferior work, and therefore admitting of a greater number of impressions than can be given when the rollers move with the frisket, and twice being required for good work, which does not admit of so great a number of impressions in a given time. These independent motions of the inking-rollers and frisket admit of a much less range of motion than when the two move together, as it is only necessary for each to clear the platen, whereas when the two are connected and move together the frisket, after it has cleared the platen and bed, must continue to move to carry the inking-rollers beyond the platen, and at the same time this affords more time for the rollers to receive the requisite supply of ink at the end of each motion.

The second part of my invention consists in so arranging the delivery rollers and tapes relatively to the location and motion of the frisket that part of it (the frisket) shall pass between the rollers and tapes that they may remove the sheet therefrom and deliver it to the fly-frame or other apparatus.

The third part of my invention relates to the mode of arranging and operating the fingers to grasp the sheet, which arrangement is as follows, viz: There are two parallel bars provided with journals at each end, placed one back of the other. To the back one are attached the upper and to the front one the lower set of fingers, and they are so connected by means of two pinions at each end that when one is turned the other must turn in an opposite direction, and also by means of a spring or springs, the tension of which constantly tends to keep the fingers closed. The rear bar turns in a frame at the rear end of the frisket, and within this frame and on the journals of this same bar is hung another frame, the ends of which project sufficiently forward to receive the journals of the forward bar, from which the lower set of fingers project. As the fingers approach the table from which they receive the sheets the ends of the forward bar enter an inclined groove on each side, which lifts the forward end of the two sets of fingers, and at the same time a crank-arm attached to the forward bar passes under a lever, which acts as an inclined plane to open the fingers to receive the edge of a fresh sheet from the table, and so soon as they have been carried forward sufficiently the lever rises and permits the tension of the spring or springs to close the fingers and grasp the edge of the sheet, which is by the back motion of the frisket-frame drawn from the table onto the frisket as it is carried under the bed to receive an impression.

The fourth part of my invention relates to the combination and arrangement of parts for giving the requisite reciprocating intermittent motions to the frame that carries the rollers for inking the form of types, which consists of two cog-wheels, one on each end of an arbor, the cogs of which take into the teeth of two racks, one on each side of the roller-frame, and the arbor of these two wheels has a pinion on one end that receives motion from a vibrating cogged sector that is actuated by a properly-formed cam on the main cam-shaft of the press.

The fifth part of my invention consists in combining with the frisket-frame an arrangement of parts substantially similar to that described as constituting the fourth part of

my invention for giving to the frisket the requisite reciprocating intermittent motions.

In the accompanying drawings, *a* represents a frame properly adapted to the various constituent parts of the press, and *b* the inverted bed, which is provided with rollers *c c c c*, that run on the side pieces of the frame as rails to facilitate the removal of it when desired to get at the form which is placed on the platen below, and when in place it is secured and held firmly by pins *d d*, that pass through the ears of two strong bars *e e*, that project over it to hold it down and resist the upward pressure of the platen *f* below. These bars *e e* may have nuts instead of the projecting ears to secure the inverted bed, which has projections for this purpose. The bars *e e* are round and pass down to the bottom of the frame to receive the bearings of the lower arm of the toggle-joint levers *g g*, so that the whole action of the pressure given by the toggle-joint exerts no strain on the frame of the press. The toggle-joint levers are operated at the required periods by means of a cam *h* on the main shaft, which acts on a roller *i*, that is hung in the connecting-rod *j* of the toggle-lever, and to resist the oblique action of the cam during part of its rotation that end of the connecting-rod which carries the roller *i* is jointed to an arm *k*, which rocks on journals at the lower part of the frame and constituting, in connection with the lower arm of the toggle, what may be called a "parallel motion." The toggle-levers, after the impression has been given, are drawn back by a cam-groove, (represented by red lines,) into which runs a pin projecting from the connecting-rod. The form of this groove must be such relatively to the form of the cam as to always keep the roller in contact with the surface of the cam. In these parts and the other connections for operating and steadying the motions of the platen there is not anything claimed as essentially new, and therefore I deem it unnecessary to give a more full and minute description of them.

The form of types is placed on the platen and is inked by the passage over them of a set of rollers *l l l l*, that have their bearings in a frame, the side pieces *m m* of which run in appropriate ways in the side pieces of the main frame and have rack-teeth along their lower edge that take into the cogs of a cog-wheel *n* on each side of the frame, the two wheels being on the same arbor *o*, and on one end of this arbor outside (or may be inside) the frame there is a pinion *p*, the teeth of which take into the cogs of a sector-rack *q*, that vibrates on a stud-pin q^3, and this rack has an arm *r*, provided with a grooved swivel-piece *r'*, that embraces a cam-fillet *s* on the face of a plate *t* on the shaft of the press-cam, the form of which is such that starting from the point 1 for nearly two-thirds the circumference to the point 2 it is concentric and holds the inking-rollers at the back end of the machine, where they receive a supply of ink from the rollers *u u* in the usual manner, and from the point 2 to 3 it rapidly approaches toward the center of motion to carry the rollers over the form of types to ink them, and then from the point 3 to 4 (this part is represented by dotted lines) it is concentric to hold the rollers (during the giving of the impression) over the rollers *v v* of the other inking apparatus at the other end of the press, and then from the point 4 the cam-fillet runs to the point 1, the place of beginning, by a curve the reverse of that from 2 to 3, to carry back the inking-rollers again over the form of types preparatory to another impression. The parts of the fillet where they cross each other are cut through to admit of the passage of the swivel-piece, which is made of sufficient length to cover the parts cut out to prevent catching. This form of cam is used for rapid printing, when it is only necessary to pass the rollers over the form once for each impression; but when it is necessary to pass them over twice for better work then a cam of the form represented at Fig. 5 is to be substituted, the fillet of which is concentric from 1 to 2, and from 2 to 3 it gradually approaches the center of motion to draw the rollers over the form, and then from 3 it runs back to 1, the place of beginning, with a reversed curve to run back the rollers. The journals of the rollers *l l l l* run in boxes, which permit the rollers to rise and fall sufficiently to roll over the form of types by their own weight, and also to pass over the rollers *u u* and *v v*, from which they receive their supply of ink.

The sheets of paper are one by one taken from a pile and placed on an inclined table *w* and registered by the pins *x*, that project for a short distance above the surface of the table. These register-pins pass through holes in the table and are attached each to the end of a small spring-arm *y*, attached to the under side of the table, and all these arms are connected together and with an arm *z* of a lever *a'*, that turns on a stud-pin *b'*, which is forced up to draw the pins below the surface of the table preparatory to the removal of the sheet by the rising of a lever *c'*, to which is jointed a sliding rod *d'*, that rests on the periphery of a small cam *e'* on the left-hand end of the main cam-shaft and outside (or may be inside) the frame. (Represented by dotted lines in Fig. 3.) The periphery of this cam is a concentric circle except for about one-fourth the circumference, where it is cut out to permit the sliding rod to descend and lift the other end of the lever, which by its connection with the arms, to which the register-pins are attached, draws them below the surface of the table to liberate the sheet of paper, which is taken away by the fingers connected with the frisket-frame and carried to the form of types, which operation is effected by the means to be next described.

The frisket *f'*, made in the usual manner, is attached to a sliding frame composed of two racks *g' g'*, connected together at one end by a cross-bar *h'*, and these racks slide in

grooves in the upper side pieces of the frame and outside of the racks of the inking-roller frame, and their cogs take into two cog-wheels i' i' on an arbor j', provided with a pinion k', that engages and is carried by a sector-rack l', the arm m' of which has a pin or roller that runs in a cam-groove n', made in the face of a wheel o' on the main cam-shaft. As this cam groove and wheel are within the plane of the section, Fig. 3, they are represented by red lines, where it will be seen that from the point 1 to 2, for nearly one-half the circumference, it is concentric and holds the frisket over the form of types that the sheet of paper thereon may receive an impression. From 2 to 3 the groove runs toward the center of the wheel to carry the frisket toward the table and the delivery-rollers to deliver the printed sheet and receive a fresh one from the table, and at 3 the curve is reversed and runs back to the point 1, the place of beginning, to carry the frisket again over the form of types. At the back end of the frame that carries the frisket are attached the fingers that take the sheets of paper from the table. They consist of two sets, the upper p' and the lower q', each attached to a separate arbor or bar r' and s', parallel with and one back of the other. These two arbors are connected together by a double helical spring t', which is coiled first around one and then around the other that its tension may tend constantly to keep the fingers closed. The finger-bar r' has its journals in projections u' u' of the frisket-frame, so that it may turn therein, and the other finger-bar s' has its journals in two short levers v' v', that are hung and turn on the elongated journals of the finger-bar r', and these two arms are connected together by a bar w' to insure their moving together. The finger-bar s' is provided at one end with a crank-arm x' for the purpose of opening the fingers, and the journals of this bar project sufficiently at each end to run into an inclined groove y' y', placed one on each side near the table.

As the frisket-frame approaches the end of its motion toward the table the forward edge of the frisket f, with the printed sheet on it, passes between two rollers z' and a'', the upper one z' turning in permanent boxes and carried by a belt b'' from a pulley c'' on the driving-shaft d'', and the lower one in boxes that slide in tubes e'' e'' and borne up by spiral springs (or in swinging arms on a shaft moved up by a cam) to make sufficient pressure to carry off the printed sheet from the frisket to the fly-frame f'', which is effected by the series of endless tapes g'', that pass from the upper roller z' over and partly around a roller h'' back of the roller a'', around another roller i'', and then back to the first. The roller z', which is in fact only a shaft, has wheels j'' on it, which may be shifted to suit the frisket and around which the endless conveying tapes pass, and which are guided and retained thereon by flanged guide-rollers k'', one for each wheel or tape. They turn on stud-pins on the ends of arms l'', projecting from an arbor m''.

The fly-frame f'', which receives the printed sheets from the delivery-rollers, vibrates on journals at the lower edge, one of which has an arm n'' jointed to a spring o'', the tension of which keeps it in a horizontal position or lying on the pile of sheets which it has delivered, and it is elevated to a vertical or inclined position at each operation to receive a printed sheet from the delivery-rollers by a cam p'' on the end of the main cam-shaft, which cam acts on a sliding rod q'', jointed to an arm r'' on one of the journals. As the frisket is moved forward to deliver the printed sheet the projecting journals of the finger-bar s' enter and run up the inclined grooves y' y', which elevates the fingers toward the edge of the sheet on the table, and at the same time the wrist of the crank-arm of this bar runs under the lever a', which turns the bar and opens the under fingers, which motion at the same time throws up the upper fingers, as the two finger-bars are geared together by two small pinions s'' s''. While these fingers are opening they are moving forward toward the edge of the sheet to be gripped, the printed sheet having been drawn out by the delivery-rollers, and so soon as the frisket-frame has completed its motion the lever c' rises, which permits the tension of the spring or springs to close the fingers to grip the edge of the sheet and at the same time forces down the register-pins, so that the sheet can be drawn from the table and dropped onto the frisket and carried over the form to receive the impression.

Motion is communicated from the driving-shaft to the main cam-shaft by a pinion t'' on the former taking into the cogs of a wheel u'' on the latter, and the two inking apparatus are driven by bands v'' and w'' from pulleys x'' y''.

The weight of the platen and form is balanced in the usual manner by rods z'' z'', extending down to spring-arms.

The plates of the cams for operating the inking-roller frame are made in two parts, as represented in Fig. 5, and secured to the wheel u'' on the main cam-shaft by means of screws, so that one can be removed and the other substituted with facility.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Giving to the inking-roller frame for inking the form of types its motions independent of the motions of the frisket-frame, substantially as described, whereby the range of motion to be given to them can be reduced, more time can be given to the rollers to receive their supply of ink, and the rollers can be carried over the form of types once, twice, or more times for each impression, as described.

2. The method of removing the printed sheet from the frisket by passing a part of

the frisket between rollers that remove the sheet and deliver it to the fly-frame or other apparatus for delivering the printed sheets, substantially as described.

3. The arrangement of the finger-bars in combination with the inclined planes into which the ends of the forward bar pass, and the lever which acts as an inclined plane to open the fingers, and then rises to suffer the tension of the spring to close them, substantially as described.

4. The arrangement of either of the cams that operate the inking-roller frame, the cogged sector, and the train of wheels, in combination with the inking-roller frame, substantially as described, whereby I am enabled to attain the required intermittent reciprocating motions more efficiently than by any other means known to me.

5. The arrangement of the cam, the sector, and train of wheels, as described, in combination with the frisket and finger frame, in the manner and for the purpose substantially as described.

RICHD. M. HOE.

Witnesses:

THOS. S. SHEPHERD,
HENRY LUDWIG.