2 Sheets—Sheet 1.

E. REYNOLDS.

LITHOGRAPHIC PRINTING PRESS.

No. 41,862. Patented Mar. 8, 1864.

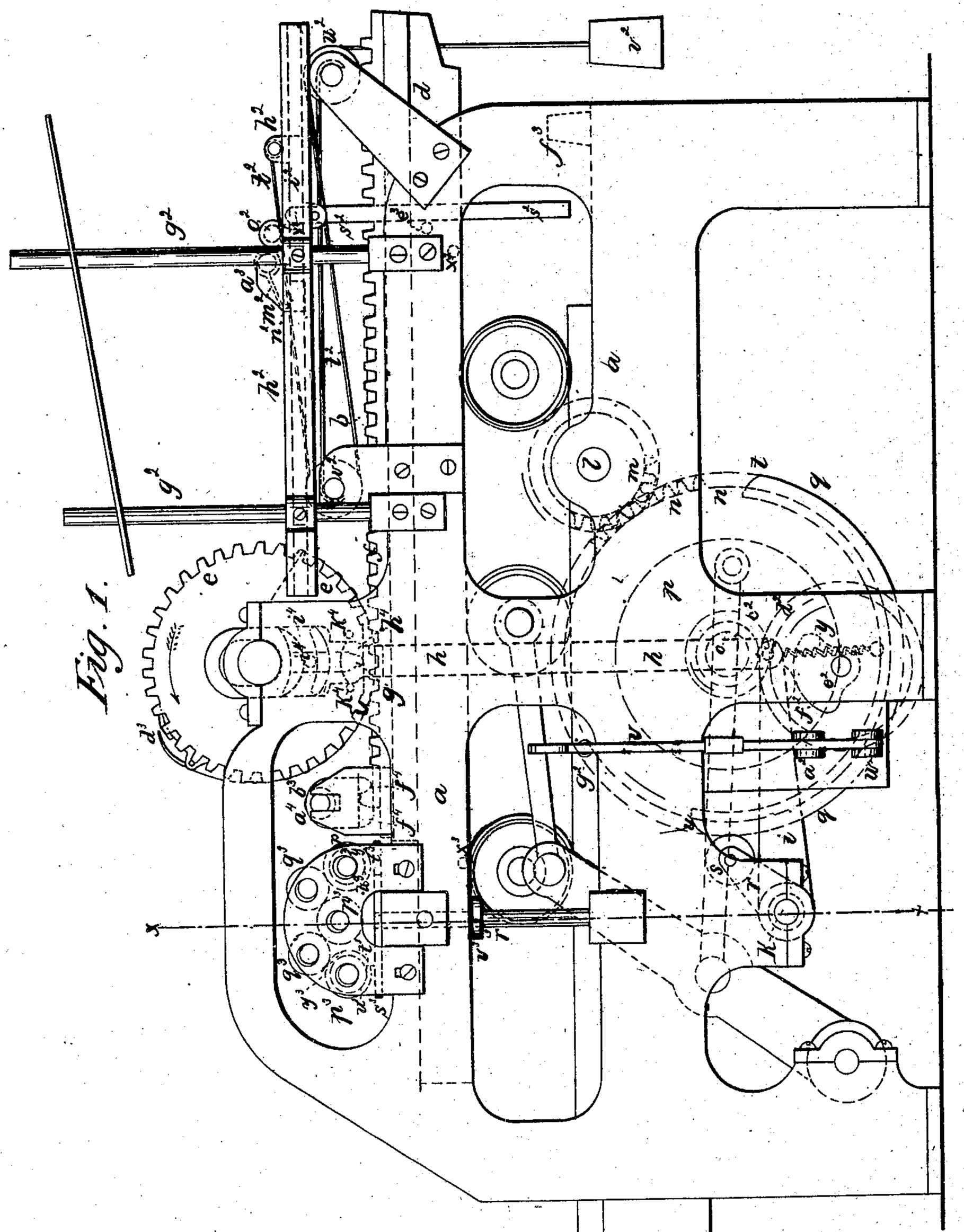

Fig. 1.

Witnesses;
J. B. Crosby
H. Gould.

Inventor:
Edwin Reynolds.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

2 Sheets—Sheet 2.

E. REYNOLDS.

LITHOGRAPHIC PRINTING PRESS.

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Fig. 4.

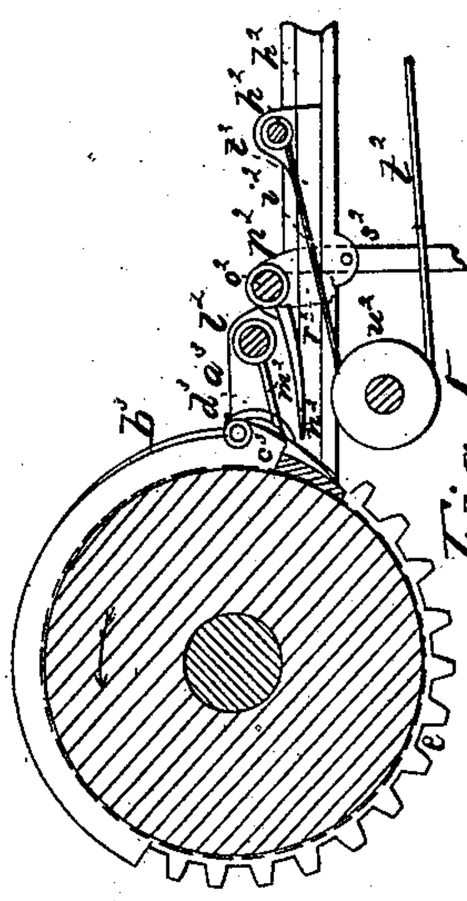


Fig. 5.

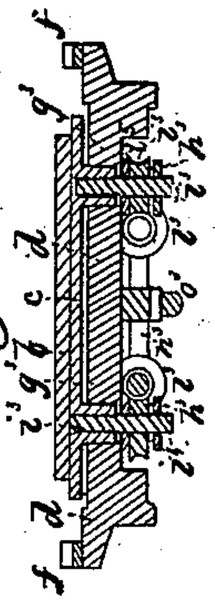


Fig. 6.

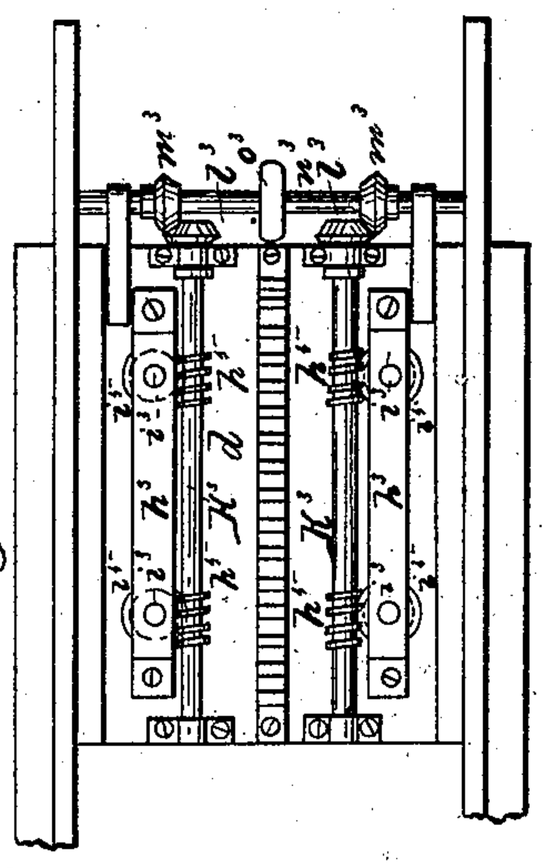


Fig. 2.

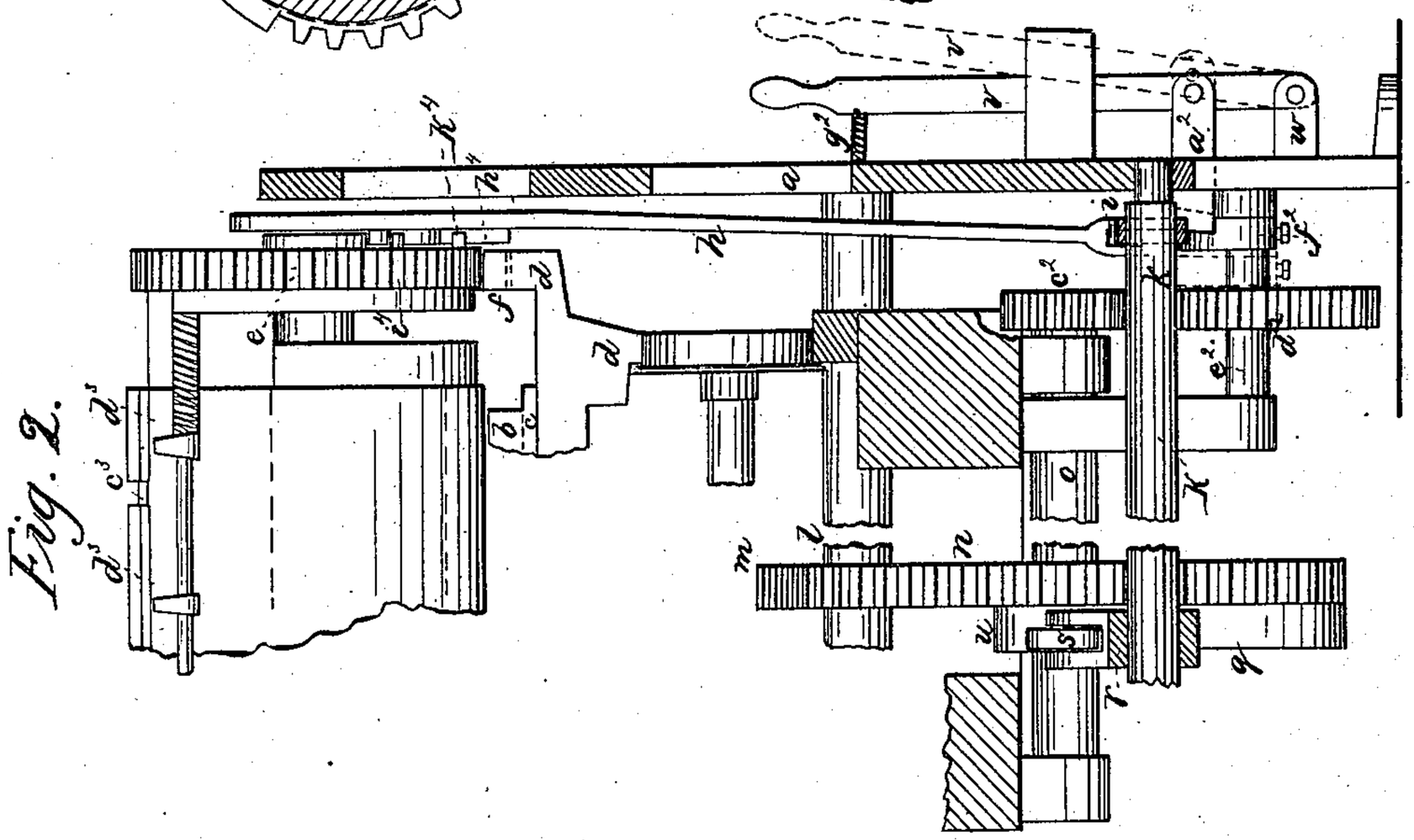


Fig. 3.

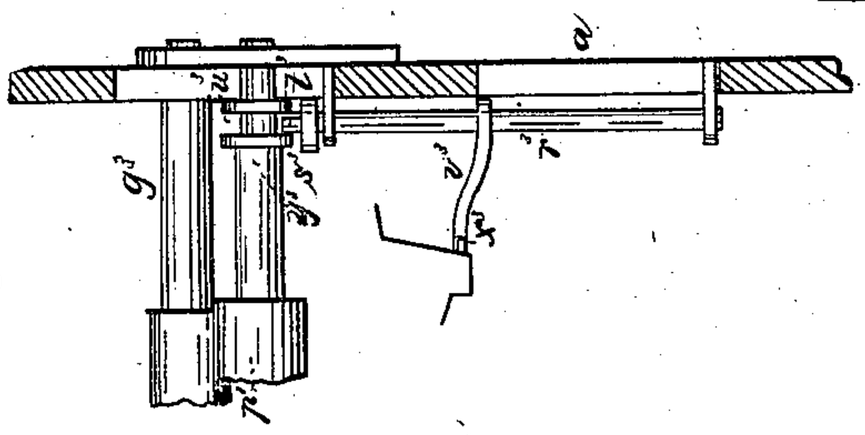
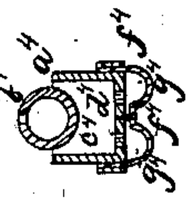


Fig. 7.



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J. B. Crosby
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Inventor:
Edwin Reynolds.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWIN REYNOLDS, OF MANSFIELD, CONNECTICUT.

LITHOGRAPHIC-PRINTING PRESS.

Specification forming part of Letters Patent No. **41,862**, dated March 8, 1864.

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, of Mansfield, in the county of Tolland and State of Connecticut, have invented Improvements in Lithographic Power-Presses; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention, sufficient to enable those skilled in the art to practice it.

These improvements relate to and are applicable to all lithographic power-presses employing a revolving tympan and a traversing stone; and my invention consists in the manner of operating the tympan with respect to the movements of the bed which carries the stone; also, in the mechanism for removing the printed sheet from the tympan; also, in an improved construction of the damper.

My improvements are shown in the accompanying drawings as embodied upon a lithographic power-press similar in its general construction and operation to the press patented by George H. Reynolds, February 17, 1863, No. 37,727, and the manner of printing with the revolving tympan is the same as that employed in said Reynolds' patent, as also in the patent of W. H. Stubbe, No. 22,519, and some others.

The operation of the cylinder of rollers and the scraper, in connection with the revolving tympan, forming no part of my invention, I have not shown them, nor will such operation need to be described in this specification.

Figure 1 of the drawings denotes a side elevation of the press. Fig. 2 is a section taken on the line *x x* of Fig. 1, and so as to show, in connection with Fig. 1, the relative position of the parts which operate the movable tooth of the tympan-gear. Fig. 3 is a view in detail of the mechanism for imparting the endwise movement to the rollers. Fig. 4 shows the mechanism for removing the sheet from the tympan. Figs. 5 and 6 denote, respectively, a bottom view and cross-section, on a scale of half the size of the other figures, of the bed and gearing for adjusting the stone. Fig. 7 is a cross-section of the damper.

a in the drawings denotes the frame-work of the machine; *b*, the stone, fixed upon a bed, *c*, which is supported on a carriage-bed, *d*, said carriage-bed being propelled by mechanism as seen in the drawings, or in any other suitable manner, to carry the stone successively into operation with the ink-rollers, the damper, and the revolving tympan. A gear, *e*, is applied to each end of the tympan-frame, said gear meshing into and being rotated by a rack, *f*, on each side of the carriage *d*. This tympan-gear is cut away on one side, and to this portion the movable tooth *g*, with its pin i^4, is applied so as to slide in the face of the gear and into and out of operation with the rack *f*, as in said Patent No. 37,727. The manner of and mechanism for operating it I will now proceed to describe.

The lower end of the vertical lifter-rod *h*, which moves the tooth up into the gear, is hung or jointed to the end of an arm, *i*, fixed upon a rocket-shaft, *k*. The driving-shaft *l* carries a pinion, *m*, which meshes into and drives a gear, *n*, as denoted by red lines in Fig. 1. The shaft *o* of the gear *n* carries the crank-wheel *p*, which, through connecting rods or links, drives the truck-frame of the carriage *d*, so that at each revolution of the gear the carriage completes its reciprocal movement through the frame *a*. To one side of the gear *n* a cam, *q*, is applied, said cam extending half-way around the circumference of the gear-wheel *n*, as seen in Fig. 1. A short arm, *r*, fixed upon the rocker-shaft *k*, bears a friction-roller, *s*, which works upon the surface of this cam. The gear rotates in the direction denoted by the arrow thereon, and during half its revolution its cam operates on the roller *s*. When the point *t* of the cam reaches the roller, the carriage *d* will have completed its return movement without rotating the tympan, and as the cam passes the roller a spring, *y*, draws down the lever *h* and brings the tooth *g* into gear with the rack, so that as the gear continues its rotation and carries the stone forward under the tympan the tympan-gear *e* and tympan revolve, and the sheet is printed.

As the opposite point, *u*, of the cam strikes the roller it lifts the arm *r*, turns the rocker-shaft *k*, lifts the arm *i* and rod *h*, and carries the tooth out of gear, so that as the carriage and stone traverse back under the tympan said tympan is out of gear with the rack. By operating the tooth in this manner its movement to and out of the rack is made positive

and always certain when the press is so arranged as to make it desirable to print at every forward movement of the stone.

A projection, h^4, is made on the back of the rod h at some distance below the line of rotation of the pin i^4 of the sliding tooth. Just above this projection, or so as to pass above it when the rod is depressed, are two pins, k^4, extending from the face of the tympan-gear. When the rod is raised so as to carry the tooth out of gear with the rack, the projection h^4 comes between the pins k^4 and locks the gear in position, preventing any movement of the tympan which might take place by contact with the stone or otherwise when the tooth is out of gear with the rack and the stone is on its return movement under the tympan.

It is sometimes necessary or desirable to cause the stone to make a number of successive reciprocal movements under the tympan without printing—as in adjusting the stone, and for other reasons; and to accomplish this without imparting any movement to the tympan I apply a stop mechanism as follows: A hand-lever, v, turning in a bearing, w, extending from the frame a, carries a catch, a^2, which extends through the frame a and against or so as to slip under the rocker-arm i, which actuates the tooth-rod h. When I wish to run the press without the movement of the tympan, I allow the catch to slip under the arm i, and this holds the tooth above the rack, a spring, g^2, or other means serving to keep the catch under the lever until such time as I wish the tympan again to operate, the catch keeping the roller s from dropping as the cam q passes it, as will be readily understood. In the usual operation of the press the lever v is held out, so as to keep the catch-pin from slipping under the rocker-arm, in any suitable manner.

It is also sometimes desirable that the press shall automatically operate, so as to make an impression only at every other forward movement of the carriage—as, for instance, when in printing very fine work, from the small quantity of ink on the roller, I wish to pass the stone under the inking-rollers twice before the impression is taken, and I accomplish this in my machine as follows: Upon one end of the shaft o a pinion, c^2, is fixed, and meshes into and actuates a gear, d^2, of twice its size, so that at each double revolution of the shaft o with its pinion c^2, gear n, cam q, and crank-wheel p the gear d^2 completes one revolution. Upon the shaft e^2 of this gear d^2 is placed a cam, f^2, which is so applied by means of a set-screw or otherwise as to be capable of being moved laterally on the shaft to carry and fix the cam under the rocker-arm i or away from and inoperative with respect to it at pleasure. The cam is so formed that when under the arm i it shall lift the arm as it rotates, and shall keep the arm i and the tooth-rod h elevated and the movable tooth out of the rack during one forward movement of the stone, and at such time as the revolution of the cam q would otherwise allow said tooth to be in gear with the rack and the tympan to rotate over the stone.

The operation of the cam is as follows: The stone having returned after operation with the tympan, the point u of the cam lifts the arms r and i, rod h, and tooth g, and as the carriage moves back the tympan-gear is disengaged, as usual. As the point t of the cam q passes the roller s the cam f^2 comes under the arm i and prevents the tooth from dropping into engagement with the rack, and keeps it up while the stone next moves forward under the tympan, keeping the tympan inoperative until the cam q again comes into action with the roller s, and keeps the tooth out of the rack during the return movement of the stone, and as the stone next moves forward the cam f^2 is out of contact with the arm i, and the tooth g falls into position to mesh into the rack and cause the tympan to revolve, thus operating the tympan at every other forward movement of the stone. When it is desired to print at every movement of the stone, the cam d^2 is slipped on the shaft, so that its surface shall not operate on the rod.

The mechanism for taking the paper from the tympan-frame is as follows: To the posts g^2, which support the feed-board, are fixed parallel ways k^2, running from near the opposite ends of the tympan-frame, and in these ways a sliding nipper frame or carriage, i^2, moves, the opposite ends of said carriage being connected by a bar or rod, k^2, and by one of the rods l^2 of the nippers. The upper nipper-jaws, m^2, are fixed immovably on the rod l^2, with respect to the carriage, and to the lower nipper-jaws, n^2. These jaws n^2 are applied to a cross-shaft, o^2, rocking in bearings p^2. Springs (not seen) tend to keep the jaws m^2 and n^2 apart, the extent of movement of the jaws being fixed by a projection, r^2, on each end of the shaft o^2, which abuts against the short arm of a swinging lever, s^2, depending from the sliding frame i^2. Cords t^2, running from the frame i, pass around grooved pulleys u^2, turning loosely on shafts affixed to projections from the frame a of the press. These cords have weights v^2 at their lower ends, by which the sliding frame is drawn up into juxtaposition with the tympan. When the truck-frame and bed are traveling back after a sheet has been printed, the weights draw the nipper-carriage after it until vertical bearing-plates a^3 of said nipper-carriage strike against cams b^3 on the ends of the tympan-frame or on the inner faces of the tympan-gears. Each of these cams extends partially around the circumference of the gears, as seen in Fig. 4. As the stone next moves forward under the tympan the cam b^3 keeps the nippers in position seen in said Fig. 4, and the cam passes the plates a^3 just in time to permit the nipper-frame to move forward a little and let the ends of the upper nipper-jaws slip into the depression c^3 of the tympan-frame, and under the edge of the paper, or between such

edge and the tympan-frame, the grippers d^3 of the tympan-frame releasing their hold upon the paper at the same time in the usual manner and by mechanism which it is therefore not necessary to describe. As the carriage and stone continue their movement under the tympan a pin, e^3, from the rack frame or carriage d strikes the lower arm of the swinging lever s^2, tipping said lever in such manner as to cause its upper arm to turn the projection r^2 from the shaft of the lower nipper-jaws, and force the nipper jaws n^2 against the upper jaws and pinch or grip the edge of the sheet between them. The continued movement of the carriage d keeps the nippers in this position, and slides back the nipper-frame with the printed sheet. As the carriage d draws near the end of its back movement the lower ends of the levers s^2 strike upon a stationary projection, f^3, on the frame a, and, stopping said lower end, the movement of the carriage and the pins e^3 causes the upper ends of the levers to draw away from the projections r^2 of the shaft of the lower nipper-jaws and releases the paper from the grasp of the nippers. The pressure of the pins e^3, after the levers s^2 strike the projections f^3, accelerates the movement of the nipper-carriage, causing the nippers to draw away from the edge of the sheets, and allowing the sheet to fall and be removed from the machine in any convenient manner. As the stone returns the nipper-frame follows after and assumes the position above described, in readiness to take the next sheet.

In adjusting the stone for the impression, in order to produce uniform rise or descent of all its parts, or to preserve the parallelism of its surface to the lower bed, I provide the upper bed, c, which carries the stone, with four screw-bearings or nuts, g^3, which are placed at or adjacent to the opposite corners of the bed c, and have vertical screws i^3 working therein. The lower ends of these screw-shafts are supported in bearing-plates h^3, and have worm-gears i^5 fixed on them, which mesh into and receive motion from worms h^5 on two horizontal shafts, k^3. The shafts k^3 have on their adjacent ends bevel-gears l^3, which are actuated by bevel-gears m^3 on a cross-shaft, n^3, which carries a hand-wheel, o^3. Through these parts, by turning the hand-wheel o^3, an exactly corresponding rotation is given to all the screw-shafts i^3 in such manner as to communicate the same amount of rise or fall to that part of the stone above each screw-shaft. This mechanism is preferable to the use of wedges for raising and lowering or adjusting the stone on account of the greater ease and precision of the movement.

Above the inking-rollers p^3, which run over or in contact with and to ink the surface of the stone, I hang two metallic rollers, q^3, in such manner that they shall rotate with and impinge against the surface of the inking-rollers. The purpose of these rollers is to press upon and smooth the surface of ink on the inking-rollers after they have been in contact with the stone, their action serving to smooth the ridges and channels made by the unequal quantities of ink removed by the stone from different parts of the rollers, and at the end of each movement of the carriage d I impart a vibratory movement to the two opposite or outer ink-rollers, as follows: A vertical rocker-shaft, r^3, turning in bearings affixed to the frame a, carries at its upper end a rocker-bar, s^3, from the opposite end of which pins t^3 extend upward into grooves w^3 in collars y^3 on the shafts of the ink-rollers p^3, as seen in Fig. 3. An arm, v^3, extends in from the shaft r^3 in such manner that as the carriage d is terminating its forward or return movement the end of the arm is struck by a dog or pin, x^3, extending from the carriage, causing the arm to swing, and thereby the pins t^3 to move the two rollers p^3 in opposite directions. By this means I distribute the surface of the ink on the rollers after each passage of the stone.

The manner of supplying the ink to the rollers forming no part of my present invention, I have not shown or described it, as any of the well-known methods may be employed.

The damper a^4 is stationary or does not rotate over the surface of the stone. It is made with a hollow or stationary shaft, b^4, under which is a trough, c^4, provided with holes d^4, through which the water passes into sponges g^4, which are placed in parallel folds of the damper-leather f^4, from which the water for moistening the stone is expressed onto the surface of the stone. These folds extend across the machine so as to come into contact with all the surface of the stone to be damped, and by making the damper with the folds the quantity of water exuding from each fold can be regulated by packing of the sponge or otherwise, and the pressure and moistening power of the different folds varied as desirable.

The water may be fed to the damper in any desirable manner.

Although, to illustrate the operation of the machine as shown in the drawings, I have described certain mechanism for releasing the paper from the grasp of the nipper-jaws, and a method of imparting a vibrating motion to the ink-roller, as also a combination of metal surfacing-rollers with the ink-rollers, I do not claim anything therein as my invention; neither do I herein claim the method described of raising, lowering, and adjusting the stone.

Having thus described my improvements, what I claim is as follows:

1. Imparting the upward motion to the movable tooth g by means of the rod h, arm i, rocker-shaft k, arm r, and cam q, operating together in the manner substantially as described.

2. The combination of the rod h, lever v, catch a^2, and arm i, for entirely arresting the descent of the tooth and the operation of the tympan, as set forth.

3. The combination of the pins k^4 and pro-

jections h^1, operating together, substantially as described, to lock the tympan in position when the movable tooth is out of gear with the rack.

4. The combined operation of the cams q and f^2 for controlling the arrest of movement of the tympan, substantially as specified.

5. Operating the nipper-jaws n^2 m^2 to close them and cause them to remove the sheet from the tympan-frame by the combined action of the pin e^3, lever s^2, and projection f^3.

6. Constructing the stationary damper with folds, in the manner and for the purpose substantially as described.

In testimony whereof I have hereto set my signature this 28th day of October, A. D. 1863.

EDWIN REYNOLDS.

Witnesses:
J. B. CROSBY,
F. GOULD.