E. Reynolds. Sheet 1. 2 Sheets.

Lithographic Printing.

No. 46,390. Patented Feb. 14, 1865.

Fig. 2.

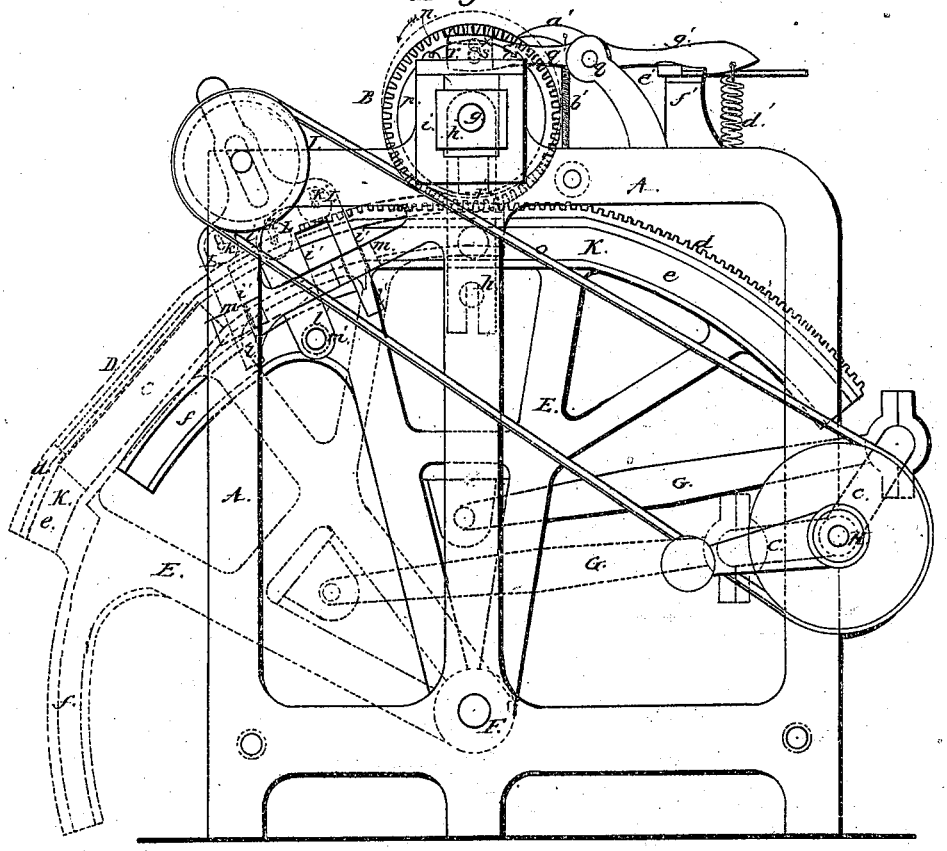
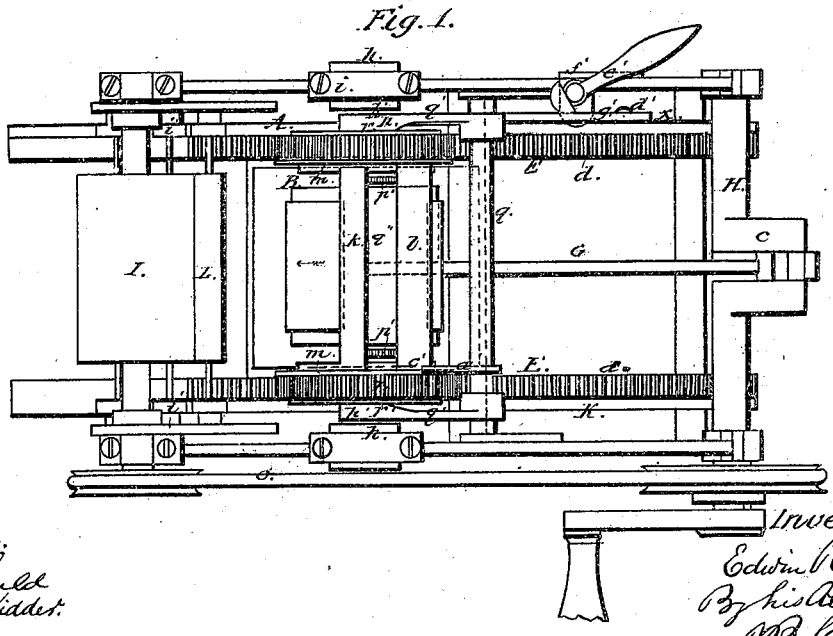


Fig. 1.



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E. Reynolds. Sheet 2. 2 Sheets.

Lithographic Printing.

No. 46,390. Patented Feb. 14, 1865.

Fig. 7.

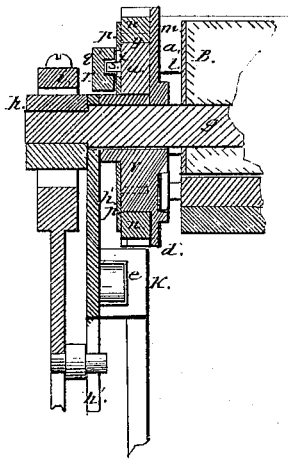


Fig. 4.

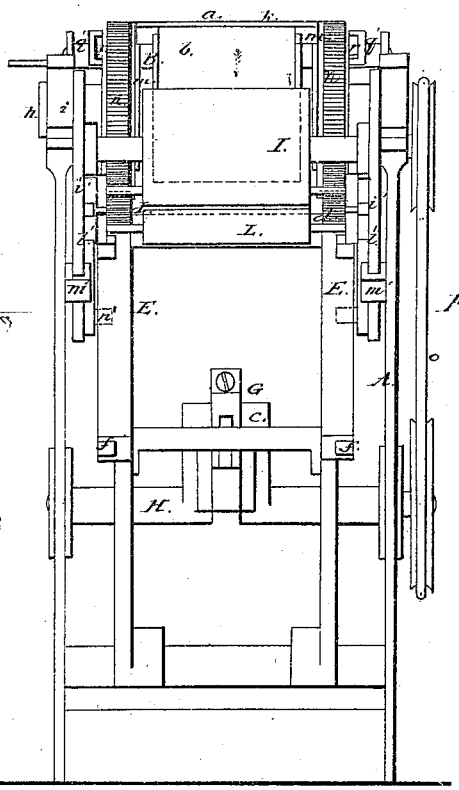


Fig. 3

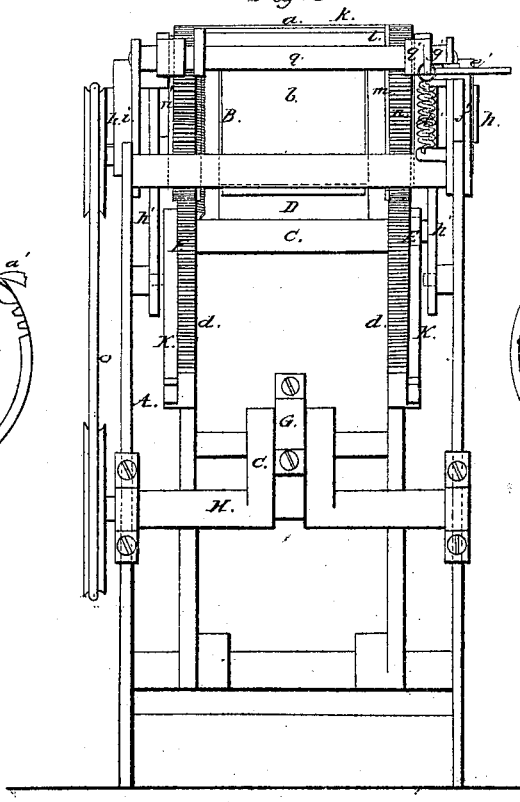


Fig. 6.

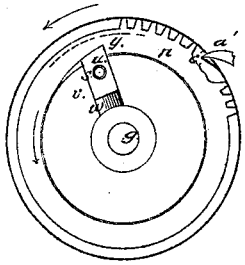
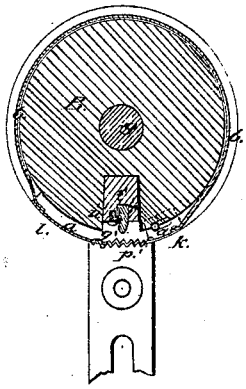


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWIN REYNOLDS, OF MANSFIELD, CONNECTICUT.

LITHOGRAPHIC-PRINTING PRESS.

Specification forming part of Letters Patent No. **46,390**, dated February 14, 1865.

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, of Mansfield, Tolland county, Connecticut, have invented an Improved Lithographic Power-Press; 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.

There are now in use, and have been projected for use, various kinds of power-presses to print from lithographic stones. In one class of them a rotary tympan is used, in connection with a horizontally-reciprocating stone. In another kind a stationary stone is printed from, the scraper reciprocating horizontally over the same; and in still another kind an oscillating carriage and stone are employed, or are designed to be employed, in connection with a tympan revolving over a series of rolls and a vertically-moving scraper.

My present invention relates to a machine having a general organization like this last kind of machine—that is to say, the stone is mounted upon an oscillating carriage and vibrates through the arc of a circle, while, in connection therewith, I employ a rotary tympan, constructed and operating not unlike the rotary tympan shown and described in what is known as the original Stubbe patent, and also in the George H. Reynolds patent, and in some others.

The improvements constituting my invention may be enumerated as follows: the mechanism or arrangement of mechanism by which the tympan-cylinder is driven directly from the oscillating frame or carriage which carries the stone; the mechanism for controlling the movement of the tympan with respect to throwing it into connection with the oscillating carriage when the stone advances, and out of connection when the stone returns; the method of throwing the tympan out of connection with the stone during both advance and retreat of the stone; the peculiar construction of the tympan-frame, which allows the scraper to be easily removed from its position; the attachment of one end of the tympan to a yielding bar applied to or forming part of the tympan-frame; the arrangement of the distributing-rolls with respect to the ink-cylinder and the plane of motion of the stone.

Figure 1 of the drawings represents a plan of my improved press. Fig. 2 is a side elevation thereof; Fig. 3, a front end elevation, and Fig. 4 a rear end elevation, of the same. Fig. 5 is a cross-section of the tympan-cylinder; Fig. 6, an end view of the cylinder and the tympan-gear, with the plate on the outer surface of the gear removed. Fig. 7 is a cross-section, taken through the center of one of the tympan-gears.

A denotes the frame-work of the machine; B, the tympan-cylinder, carrying the tympan-frame *a* and the tympan *b*. C is the carriage-bed, which supports the stone D, such carriage-bed being supported upon and vibrating with an oscillating frame, E, which is mounted on a horizontal shaft, F, on which the frame, with the bed C and its stone, vibrates as a center. A connecting-rod, G, is jointed to the frame E, and also to a bell-crank, *c*, on the driving-shaft H, the vibrating motion being thus imparted to the stone, as will be readily understood. Motion is also communicated from this shaft H to the ink-cylinder I by a belt, *o*, as seen in Fig. 2. Each side piece of the frame E has a top plate, K, the upper surface of which is constructed with or has applied to or built upon it a toothed or gear rack, *d*. The outer surface of each plate K has a slot or cam-groove, *e*, running from the front end of the stone to the rear end of the plates, and another groove, *f*, running from just below the inner end of the first groove to the front end of the plates. The grooves *e* imparts the vertical movements to the tympan-cylinder, while the grooves *f* actuate the ink-rolls, as will be hereinafter set forth.

The tympan-cylinder B is supported on a horizontal shaft, *g*, the opposite ends of which are journaled in boxes *h*, which slide vertically in housings *i*. The cylinder B does not rotate, but the tympan *b* revolves around its surface. The tympan-frame *a* is made in two parts or plates, *k l*. The plate *l* is stationary with respect to the tympan, one end of which is fastened to it. This plate extends over the tympan-cylinder to two circular disks, *m*, one on each end of or adjacent to the tympan-cylinder. These disk-plates turn loosely on the shaft *g*, and as they rotate they carry with them the tympan-frame and tympan. Against the outer surface of each disk there is an annulus or ring-gear, *n*. Each ring ro-

tates freely on a hub-plate projecting from the disk *m*, and is kept in lateral position by and between the disk *m* and circular plates *p* on the outer sides of the gears. The circular gears mesh into and are driven by the oscillating gears of the stone frame E. When the stone is being carried forward under the tympan to print, the forward movement of the rack *d* rotates the gears *n*, and this rotation is imparted to the disks *m*, plates *p*, tympan-frame *a*, and tympan *b*. As the stone, after completing its forward traverse, begins to move back, the ring-gears meshing therein are rotated in the opposite direction; but the disks *m*, plates *p*, tympan-frame, and tympan are held still—that is to say, they rotate only in the direction of the arrow, or in printing the impression, while the ring-gears rotate in both directions. This is effected as follows: A horizontal rocker-shaft, *q*, has fixed upon each end an arm, *q'*, extending from the shaft over the shaft of the tympan-cylinder, as seen in Fig. 2. The inner face of each arm is made with an inclined or cam slot, *r*, said slot being in the path of rotation of a pin, *s*, projecting from a sliding tooth, *u*, which slides in the face of the hub-plate *v*, upon which each gear-ring *n* turns. This tooth is shown more particularly in Fig. 6, which is an end view of the tympan-cylinder or the gear-ring, with the outer plate, *p*, removed. The tooth slides in a radial direction in the slot *w* in the hub-plate *v*, and the pin *s*, projecting from the tooth, slides in a slot, *x*, in the plate *p*. The slot *w* opens out of the perimeter of the plate *v*, so that the outer end of the tooth can be projected beyond the plate. A depression, *y*, is formed in the inner surface of each gear-ring *n*, such depression being fitted by the point of the tooth *u*, the depression and tooth when in connection forming a clutch, which causes the hub-plate to rotate with the gear in the direction of the arrow, such rotation being imparted to the disks *m*, from which the hub-plates project, and through them to the tympan-frame and tympan, as will be readily understood, while when out of connection the gear rotates in the opposite direction without imparting its movement to the hub-plate and tympan. Suppose the tooth and depression to be in connection and the gear and tympan to be rotating together in the direction of the arrow. The pressure of the end of the depression in the ring keeps the tooth in place, and the ring and hub-plate in connection during the forward movement of the stone and its frame; but when the return movement of the stone commences and the gear-ring begins its consequent rotation in the opposite direction, the inclined surface of the depression, acting on the outer end of the tooth, forces it down within the face of the hub-plate, and the gear of course rotates without motion being imparted to the plate-disk and tympan. The tooth keeps in this position during this rotation of the gear, but the spring acting on each arm causes its slotted end to hold the pin up against the inner surface of the ring, and when the depression comes above the tooth the tooth is pressed into it, and as the gear again rotates in the direction of the arrow it carries the hub-plate with it as before.

A pawl, *a'*, held down by a spring, *b'*, against the perimeter of one of the disks *m*, springing into a notch, *c'*, when the tympan completes its revolution, prevents the back rotation of the disk. When it is desired to give both forward and back movements to the stone without printing, as in extra rolling or in preparing or adjusting the surface of the stone, it is necessary to prevent movement of the tympan. For this purpose an arm, *g'*, extends to the rear of the shaft *q*, and has a spring, *d'*, connecting it to the frame A. This spring holds the slotted ends of the arms *q'* in position, so that when the pins *s* are within the arm-slots *r* the springs have a tendency to hold the teeth against the inner surface of the gear-ring. A lifter-bar, *e'*, swings upon the top of a projection, *f'*, from the frame A, under an incline on the lower surface of the extension *g'* of the arm *q*. By turning the bar the extension *g'* is raised and the rocker-shaft *q* turned so as to depress the slotted ends of the arms *q'*, the lifter-bar holding the arms so depressed. When the pins *s* now come into the slots, the top surface of the slot bears down the pin so that it cannot slip into its depression in the gear-ring, and consequently the rotation of the ring is continued each way as the stone is traversed without any rotation of the tympan.

As the surface of the stone is flat, if the gear-rack upon the frame E were circular adjacent to the stone, the tympan could not of course come into contact therewith. While each rack beyond the line of the stone or stone-bed is made in the arc of a circle from the shaft F, rotating the tympan-cylinder when in contact with its gears upon a fixed axial line, the parts of the racks opposite the ends of the bed C are made straight and in the same or a parallel plane with the surface of the stone, while the tympan-cylinder or its boxes slide vertically to correspond with the movement of the stone.

The stone and tympan are kept in contact while the tympan is rotating, and the stone passing under it, as follows: Each end of the shaft of the tympan-cylinder is supported in a bearing-plate, *h'*, on the inner surface of which a friction-roller is placed, said roller extending into the cam-groove *e* before referred to. This groove is made parallel to the flat or straight part of the rack and concentric to the curved part thereof, so that when the surface of the stone is moving forward under the tympan the grooves *e* and plate *h'* bring and keep the tympan-cylinder and tympan down to the surface of the stone, while the tympan is rotated by the gears.

The ink-cylinder 1 rotates in stationary bearings in top of the frame A, and some distance above the path of movement of the

stone. Between the surface of this cylinder and the path of the stone is a series of three or more ink-rolls, L L L. These rolls are so arranged and operated that when the stone is passing under them toward the tympan they lie in contact with and roll its surface to distribute thereupon the ink, while after the stone passes them they rise from their position, and are brought in a circle around and into contact with the surface of the ink-cylinder to receive ink therefrom. This is effected as follows: The opposite ends of the roll-shafts are journaled in sliding carriages *i*, the upper ends of which have elongated slots *k'*, through which the shaft of the ink-cylinder extends, while the lower ends or arms, *l' l'*, slide through boxes *m' m'* on the frame A. A friction-roller, *n'*, on each carriage-frame *i'* extends into the cam-groove *f*. The slots *k'* allow of movement of the ink-rolls to and from the cylinders, but not of lateral movement. The carriage-frame *i'* and the ink-rolls slide freely in a vertical direction. When the stone is passing under the rolls, they rest by gravity upon the surface thereof, or are rotated in contact therewith by pulleys on their shafts running over the tops of the rack-plates *d*. As the cam-grooves *f* reach the friction-rolls *n'*, they lift the rolls, and with them the carriage-frames and ink-rolls, the shafts of the ink-rolls resting in the bottoms of their boxes, which are arranged centrally from the axis of the ink-cylinders, while the groove *f* holds the rolls up in contact with the rotating surface of the ink-cylinder. Thus it will be seen that at each movement of the stone under the ink-rolls they are brought into contact therewith, while when the stone is moving under the tympan-cylinder the rolls are carried up and inked by the ink-cylinder.

As before alluded to, the tympan-frame is made in two pieces—namely, a fixed plate, *l*, to which one end of the tympan *b* is secured, and which connects the disks *m*, and a movable plate, *b*, to which the other end of the tympan is fastened. The plate *b* or projections from the ends thereof rests upon pins extending through slots, and it is fastened to the fixed plate *l* by springs *p'*. This construction of the tympan-frame in two parts, one of which is confined to the other by springs, allows the tympan to yield as circumstances may require. As made before, with the opposite ends attached to opposite sides of a tympan-plate, considerable difficulty is experienced from the inelasticity of the tympan, especially where a metallic tympan is used. The two plates *k l* are so applied as to leave a space, *q''*, between the plates. This space allows access to the scraper *r'* by bringing the tympan-frame round to the bottom of the cylinder B, (see Fig. 5,) whereas in other presses with rotary tympans the tympan-frame and cylinder have to be removed to reach the scraper for adjustment or removal.

By constructing the scraper with depressions *l'*, against the ends of which the heads of screws *u'* abut, the scraper can be removed by simply starting the screws, and as easily replaced. The mechanism for bringing the scraper against the stone and keeping it therefrom at proper times is not new, and is not particularly shown in the drawings.

In the press referred to in the beginning of this specification as employing an oscillating carriage to give movement to the stone the tympan does not receive its motion from the said carriage, but is driven by a train of gearing and belting from the main shaft. This arrangement is objectionable, because there is liability not to have a perfect coincidence of movement between the tympan and the stone; but by gearing the tympan-frame directly to the bed of carriage the movements of the surfaces of the stone and the tympan-surface must be coincident.

In what is known as the "Ackerman patent" an arrangement of mechanism is shown for keeping the tympan and stone-carriage in connection in advance of the stone and throwing them out of connection, so as to stop the tympan as the stone recedes. The mechanism, however, for effecting this result differs from that herein shown and described, and there is no provision for disconnecting the tympan-frame and the stone-carriage during both the advance and receding of the stone.

I am aware that in horizontal presses where the tympan-stone moves under the tympan in a horizontal plane it is customary to drive the tympan direct from the stone-carriage. With a stone mounted upon an oscillating carriage, however, this is not easy of accomplishment, because the different parts of the surface of the stone are not equidistant from the center of motion of the carriage, and the surface of the stone, if the axis of the tympan-cylinder were stationary, would not be impinged upon by the tympan. This difficulty is obviated in this invention by so applying the rotary tympan and constructing the oscillating carriage-racks, which communicate rotary motion to the tympan, that while the stone is passing under the tympan-cylinder said cylinder has vertical movements imparted to it to keep the tympan in contact with the stone.

1 claim—

1. In combination with an oscillating carriage, through which movement is imparted to the stone to ink its surface and to carry it under the tympan and rotation is imparted to the tympan, the construction of the oscillating gears by which the tympan is kept in contact with the stone, as they move in juxtaposition, when this construction is combined with mechanism which arrests the motion of the stone or locks it in position during the back movement of the stone.

2. The arrangement of the mechanism for connecting the tympan-gears with the tympan-frame for the forward movement of the stone and disconnecting them for the back movement of the stone, substantially as set forth.

3. So arranging this clutching mechanism

that the tympan-frame can be disconnected from the tympan-gears for the entire back and forth movement of the stone.

4. So constructing the tympan-frame that while one end of the tympan is stationary with respect to the tympan-cylinder the other end is attached to a yielding bar, for the purpose substantially as described.

5. Constructing the rotary tympan-frame with an open space between its two parts *l* and *k* to permit access to or removal of the scraper when the tympan is in position to bring such space beneath the scraper, substantially as shown and described.

6. When a series of three or more ink-rolls are employed, such disposition and application of them with reference to the path of movement of the stone and the position of the main ink-cylinder that while the rolls are brought into position to rotate in contact with the flat surface of the stone as it traverses beneath them they shall also be carried at proper times by a series of concentric bearings into positions around and in contact with the curved surface of the main ink-cylinder, substantially as described.

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