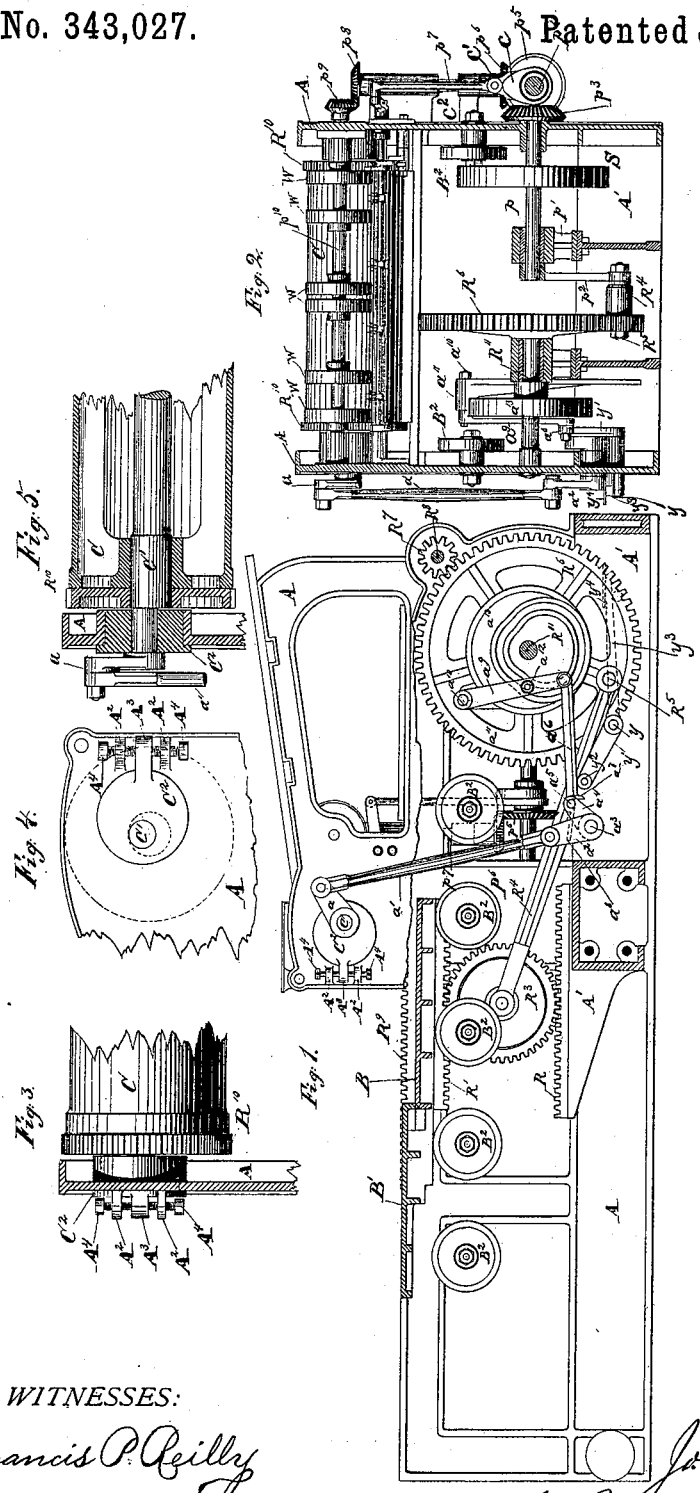
(No Model.) 2 Sheets—Sheet 1.

J. T. HAWKINS.

CYLINDER PRINTING MACHINE.

No. 343,027. Patented June 1, 1886.



WITNESSES:

Francis P. Reilly

Edward S. Berrall.

INVENTOR

John T. Hawkins

by Bakewell, King & Voorhees

ATTORNEYS

(No Model.) 2 Sheets—Sheet 2.

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CYLINDER PRINTING MACHINE.

No. 343,027. Patented June 1, 1886.

Fig. 5.

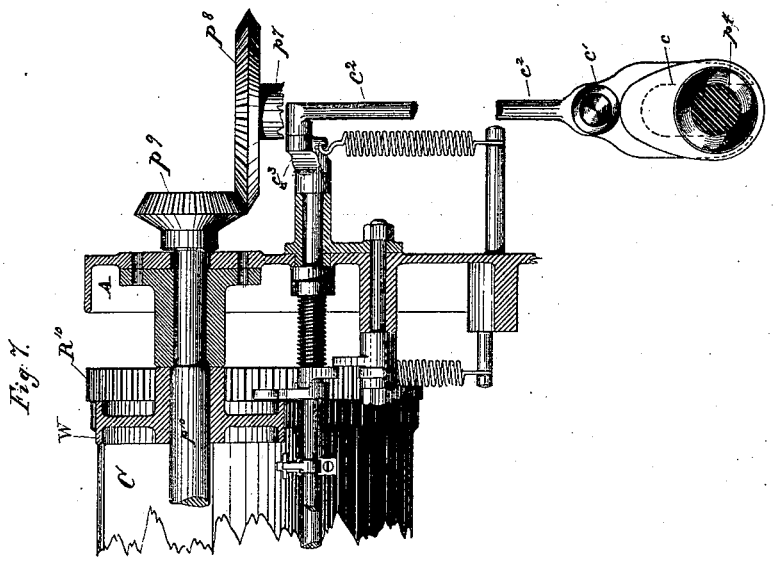
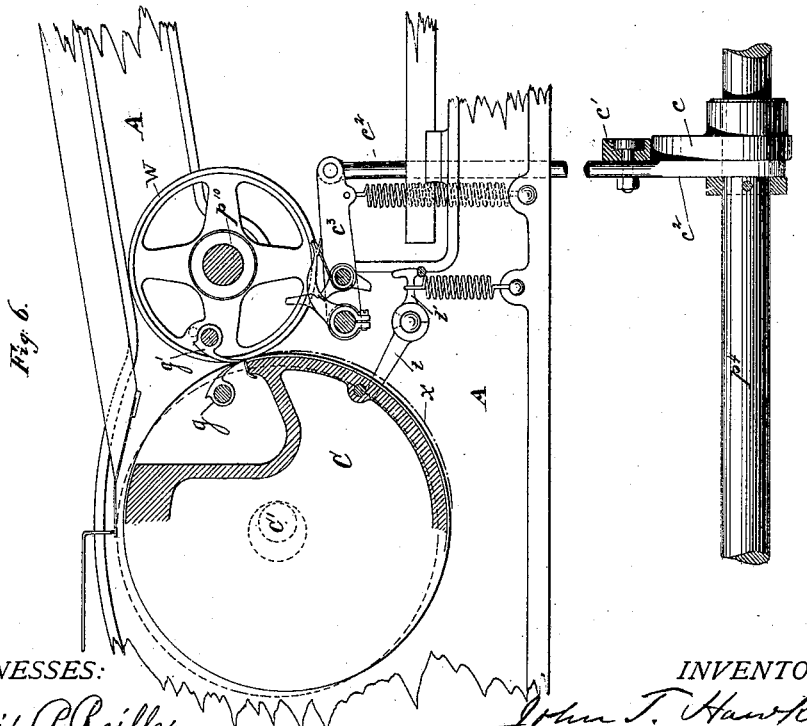


Fig. 6.



WITNESSES:

Francis P. Reilly

Edward S. Berrall.

INVENTOR

John T. Hawkins

by Brodhead, King & Voorhees

ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

CYLINDER PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 343,027, dated June 1, 1886.

Application filed December 26, 1883. Serial No. 115,603. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented a new and useful Improvement in Cylinder Printing-Machines, which invention or improvement is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is, first, to adapt the method of delivering the sheet (shown in Patent No. 286,814, granted to me October 16, 1883) to a cylinder-press in which the reciprocating type-bed is actuated by a crank motion and the cylinder geared directly to the bed, the cylinder running in both directions as actuated by the type-bed; second, to provide means for easily raising and lowering the impression-cylinder alternately, as required, so as to make the impression on the printing-stroke and clear the type on the non-printing stroke of the bed, and by the same motion to carry the impression-cylinder away from contact with the delivery-wheels during the non-delivery of the sheet; third, to provide means for easily tripping the impression-cylinder so that it may remain away from contact with the type or form, when desired, during both the forward and backward strokes of the bed; fourth, to so place the bearings of the impression-cylinder as to bring them more nearly over the impression-surface of the cylinder, and to dispense with a shaft fixed in the said cylinder; fifth, to provide a cheap method of journaling the cylinder which will permit of easy adjustment of the impression and allow of the raising and lowering of the cylinder without resorting to sliding arms or rods in which to journal said cylinder, or weights to counterbalance its weight, and to so construct this mechanism as to permit of all the work therefor being done by simple boring and turning only.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, with the larger part of one of the side frames removed, of a cylinder printing-press embodying the invention. Fig. 2 is a rear end elevation of the same, partly in section, with several parts omitted for the sake of clearness. Fig. 3 is a front elevation of part of the impression-cylinder, with a part of the side frame in section, showing the means for adjusting the impression. Fig. 4 is a side elevation of the same. Fig. 5 is a rear elevation showing part of the impression-cylinder with a portion of the side frame, all in section, further illustrating the means for raising and lowering the cylinder and adjusting the impression. Fig. 6 is a horizontal vertical section, and Fig. 7 a transverse section, both enlarged, of the apparatus constituting the sheet delivery.

The letter A indicates the main frames of the machine; A′, a bed-piece to which the frames A are secured.

B indicates the type-bed, and B′ the ink-plate.

The letters B^2 indicate rollers running upon studs in the frames A carrying the type-bed B.

R indicates a rack secured to the bed-piece A′, and R′ a rack secured to the under side of the type-bed B.

R^3 indicates a rolling pinion engaging the racks R and R′.

R^4 indicates a connecting-rod bifurcated at the end, articulated to the shaft of the pinion R^3, and connecting at the other end to a crank-pin, R^5, secured within a crank-gear, R^6.

R^7 indicates a pinion carried on a shaft, R^8, journaled in the frames A, to which power is applied in any suitable way.

The letters R^9 indicate two racks on the top side of the bed B, engaging corresponding gears, R^{10}, on the ends of the cylinder C.

All the parts described to this point illustrate the movement of the bed and cylinder in the same manner as shown in Patents Nos. 257,576, 257,578, 257,579, 257,580, and 257,581, granted to me May 9, 1882, the cylinder running in both directions, as actuated by the crank R^6 through the connecting-rod R^4, pinion R^3, racks R and R′, and racks R^9.

C indicates the impression-cylinder, and C′ a rock-shaft journaled in eccentric bushes C^2 in the frames A. The rock-shaft C′ has its journals runing in the eccentric bushes C^2 turned eccentrically to that portion of the shaft passing through the cylinder C, and the cylinder C is provided with bearings at its ends turning freely upon the rock-shaft C′. On each of the frames A are cast two lugs, A^2, and upon each of the eccentric bushes C^2 is cast a single lug, A^3. In each of the lugs A^2 is tapped a set-screw, A^4, whose ends engage the single

lug A^3. By the proper adjustment of the bushes C^2 by the set-screws A^4 the pressure of the cylinder upon the form may be adjusted to a nicety and there maintained. Upon one end of rock-shaft C′ is secured an arm, *a*, to which is articulated a connecting-rod, *a′*, whose lower end is in turn articulated to an arm, a^2, which is secured to a short rock-shaft, a^3, journaled in the frames A. On the inner end of rock-shaft a^3 is secured an arm, a^4, carrying on its end a pin or roller, a^5.

The letter a^6 indicates a connecting-rod having on one end a hook, a^7. The right-hand side or jaw of the hook a^7, as seen in Fig. 1, is carried downward to a considerably greater length than is necessary to engage the pin or roller a^5, and its left-hand side or jaw terminates in an inclined plane, a^8, the hook at this side being only sufficiently deep to engage the pin or roller a^5 properly. The other end of connecting-rod a^6 is articulated to a lever, a^9, fulcrumed upon a stud, a^{10}, secured to a bracket, a^{11}, extending upward from the base-piece A′. The lever a^9 carries a roller, a^{12}, engaging a grooved cam, a^{13}. On a short rock-shaft, *y*, journaled in the frames A on the inside of frames A, is secured an arm, *y′*. On the free end of the arm *y′* is a roller, y^2, upon which the free end of the connecting-rod a^6 may run. Outside of frame A, as shown in dotted lines, Fig. 1, and in full lines, Fig. 2, is an arm, y^3, terminating on its free end with a foot-piece, y^4. The amount of depression which may be given to the foot-piece y^4 is limited by a proper stop in the frame A, (not shown,) and is never sufficient to raise the long side of the hook a^7 above the pin or roller a^5, while always sufficient to allow the short side of hook a^7 to be lifted clear of the pin or roller a^5. The foot-piece y^4 may be made to pass under a catch on the side frame, A, so that it may be left in the depressed position.

The grooved cam a^{13} is secured in proper position to the shaft R^{11} carrying the crank-gear R^6.

The parts just described are so proportioned as to cause the rock-shaft C′, through the instrumentality of the cam a^{13}, and its connecting mechanism, to rotate through an arc of ninety degrees, and the eccentricity given to rock-shaft C′ is sufficient to raise the cylinder C a sufficient distance from the form to clear it freely upon the non-printing stroke of the bed. In doing this it also carries the cylinder C to the left, as shown in Fig. 6 by the dotted circle, a similar distance, for purposes hereinafter described. This movement of the cylinder C upward and to the left, Fig. 6, is therefore performed at every complete evolution of the machine.

By operating the hook a^7 and tripping-levers *y′* y^3, the cylinder is left in its elevated position when desired, for by disarticulating the hook a^7 from the pin or roller a^5, the cylinder can never be left in contact with the form during the non-printing stroke, no matter at what part of the machine's evolution the attendant may depress the foot-piece y^4. Thus, if the foot-piece y^4 be depressed when the pin or roller a^5 is in the position shown in Fig. 1, as the long side of hook a^7 never rises above the pin or roller a^5, the arm a^4 will be pushed to the left until the cylinder is brought to the raised position and left in that position so long as the foot-piece y^4 is kept depressed, as the short side of hook a^7 will be raised above the pin or roller a^5, and the same will be true if this operation be performed at any other point than that at which the arm a^4 is at its extreme left-hand position, Fig. 1. If performed when the arm a^4 is at its extreme left-hand position, Fig. 1, it will be left there, and if the hook a^7 is dropped at any other point by the raising of the foot-piece y^4 by the attendant the inclined plane a^8 will run up upon the pin or roller a^5, and cause the hook a^7 to articulate again with the pin or roller a^5 at the proper time. The shaft *p*, journaled in a bracket, *p′*, attached to the base-piece A′ in the frame A, is actuated by a drag-crank, p^2, from the crank-pin R^5, and carries on its outer end a bevel-wheel, p^3. The bevel-wheel p^3 meshes with a similar wheel (not shown) on a longitudinal shaft, p^4, journaled in brackets extending from the frame A. On shaft p^4 is secured another bevel-wheel, p^5, engaging a bevel-wheel, p^6, on a vertical shaft, p^7. On the upper end of shaft p^7 is secured a bevel-wheel, p^8, engaging a bevel-wheel, p^9, secured on the horizontal shaft p^{10}, journaled in the frames A. Secured to the shaft p^4 is a cam, *c*, engaging a roller, *c′*, carried upon a vertical connecting-rod, c^2. The connecting-rod c^2 is bifurcated at its lower end to embrace the shaft p^4. The upper end of the connecting-rod c^2 is articulated to a lever-arm, c^3. The operation of the cam *c* through its connecting mechanism raises and lowers the arm c^3 at the proper times. The shaft p^4 is rotated isochronously with the shaft R^{11}, so that the arm c^3 is elevated and depressed once for each complete evolution of the machine. The time of rotation of the shaft p^{10} is so proportioned that the grippers *g g′* will meet once for each complete evolution of the machine, and only once. In the machine as shown the shaft p^{10} makes three revolutions to each complete evolution of the machine; but this is arbitrary, and may be made in any proportion to suit the other conditions involved. In this construction, then, the shaft p^{10} will make three revolutions to each double oscillation of the cylinder C. The respective diameters, and therefore the peripheral velocities, of the wheels W, secured to the shaft p^{10}, are such that at the time of the meeting of the grippers *g g′* said grippers shall both be traveling at about the same velocity, or, preferably, the grippers *g′* slightly the slower of the two sets of said grippers. The peripheral velocity of the cylinder C, carrying the grippers *g*, will, however, continue slightly the faster until the last end of the sheet is nearly printed, thus bulging the sheet in the mean-

time slightly away from the surface of the cylinder C, as shown at X in dotted lines, Fig. 6; but, by the thereafter retarding action of the crank, the motion of said cylinder becomes slower than that of the uniformly-rotated wheels W until the sheet is again drawn in contact with the cylinder C by the time the printing is completed. After the completion of the printing the cylinder C reverses its rotation, while the wheels W continue on in the original direction, taking the sheet from the cylinder C from this point until completely removed in a direction contrary to that of the motion of said cylinder. By the action of the rock-shaft C′, as heretofore explained, at the completion of the printing the cylinder C is not only raised away from the form, but also carried an equal distance to the left, Fig. 6, or away from contact or close proximity to the wheels W, so that upon the passage of the grippers g' the second and third times past the point at which they take the sheet from the grippers g they do not come in contact with the cylinder C, although opened at every revolution of the wheels W by the cam and mechanism shown and described in Patent No. 286,814, above mentioned. This construction renders unnecessary the substitution of a movable cam arranged for opening the grippers g' at every third revolution only of the wheels W. The remaining mechanism for delivering the sheet is fully described in Patent No. 286,814, above mentioned, the air-pump and blast-pipe therein shown being omitted from these drawings. S, Fig. 2, is the cam from which said air-pump is actuated, and the trip-arms $t\ t'$ are made herein to oscillate on one stud with a stop-joint instead of on two studs, as described in the above-mentioned patent, and the operation of the lever t is downward during the non-printing revolution of cylinder C, instead of upward by the continuously-rotating cylinder, as in the patent above mentioned.

In Patent No. 272,835, granted to me February 20, 1883, a type-revolving cylinder is shown in combination with impression-cylinders and eccentric rock-shafts for imparting eccentric motion to said impression-cylinders, said shaft being similar to the rock-shaft C′ herein. I do not therefore herein claim said combination; but,

Having thus fully described my said improvements as of my invention, I claim—

1. In a cylinder printing-press, the combination of a reciprocating type-bed provided with a toothed rack, an impression-cylinder, as C, geared to and oscillated by said rack, and a rock-shaft journaled in exterior set bearings and provided with eccentric journals whereon said cylinder is mounted in internal bearings freely turning upon said eccentric journals, whereby the impression-surface of said cylinder is both elevated out of contact with the type-surface on said bed and lowered into such contact without ungearing said cylinder and rack, substantially as and for the purposes set forth.

2. In a printing-press, the combination, with a reciprocating type-bed, of an impression-cylinder, as C, turning freely on an eccentric rock-shaft, as C′, and eccentric bushes, as C^2, for the reception of the journals of said eccentric rock-shaft, whereby said cylinder is adapted to be turned in either direction upon its axis, is eccentrically oscillated, and also adjusted to regulate the impression, substantially as and for the purposes set forth.

3. In a printing-press, an eccentric rock-shaft, as C′, carrying an impression-cylinder, as C, freely turning thereon, in combination with mechanism for automatically operating said rock-shaft, as arm a, connecting-rod a', arm a^2, rock-shaft a^3, arm a^4, carrying pin a^5, hooked connecting-rod a^6, arm a^9, roller a^{12}, and cam a^{13}, substantially as and for the purposes set forth.

4. In a printing-press, mechanism for tripping the impression-cylinder through the oscillation of a rock-shaft, as a^3, consisting of an arm, as a^4, secured to said rock-shaft, and carrying a pin or roller, as a^5, and connecting-rod, as a^6, actuated, substantially as described, by any suitable moving part of the machine, and carrying on its free end an unequal-jawed hook, as a^7, and an inclined plane extending from its shorter jaw, as a^8, and suitable means for disconnecting the shorter jaw of the hook while leaving the longer jaw free to act, as arm y', roller y^2, rock-shaft y, arm y^3, and foot-piece y^4, substantially as set forth.

5. In a cylinder printing-press, in combination with a reciprocating type-bed, as B, an impression-cylinder, as C, oscillated by said bed at a varying velocity, and provided with sheet-grippers, as g, and a receiving cylinder or cylinders, as W, continuously rotated at a uniform velocity, and provided with sheet-grippers, as g', said cylinders being thus actuated by means, substantially as described, whereby provision is made for the respective sets of grippers to coact to transfer the sheets from said oscillating to said receiving cylinder only at the point where said cylinders reach the same angular velocity in their respective rotations, substantially as and for the purposes set forth.

6. In a cylinder printing-press having a reciprocating type-bed and an impression-cylinder provided with internal bearings turning freely upon an eccentric rock-shaft, as C′, the combination of said cylinder-shaft and a delivery-cylinder or series of delivery-wheels, as W, so that the eccentricity of said shaft, while lifting the impression-cylinder to clear the form, shall at the same time move it away from actual contact with or out of close contiguity to said delivery-cylinder or series of delivery-wheels, substantially as and for the purposes set forth.

JOHN T. HAWKINS.

Witnesses:
ELISHA T. JACKSON,
JOHN F. MONTGOMERY.