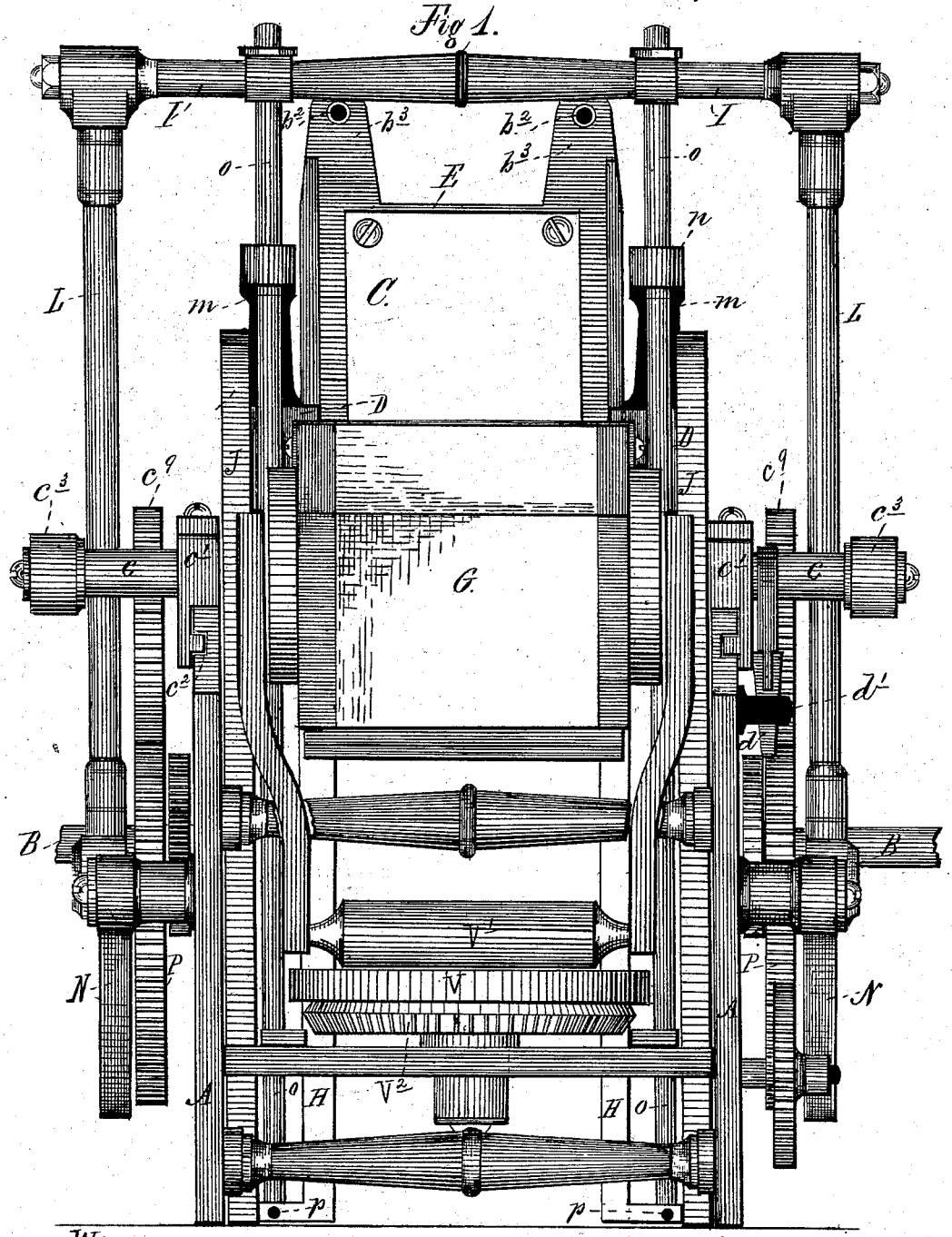
5 Sheets—Sheet 1.

T. C. KENWORTHY & A. McGREGOR.

Plate-Printing Machine.

No. 203,465. Patented May 7, 1878.

Fig 1.



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5 Sheets—Sheet 2.

T. C. KENWORTHY & A. McGREGOR.

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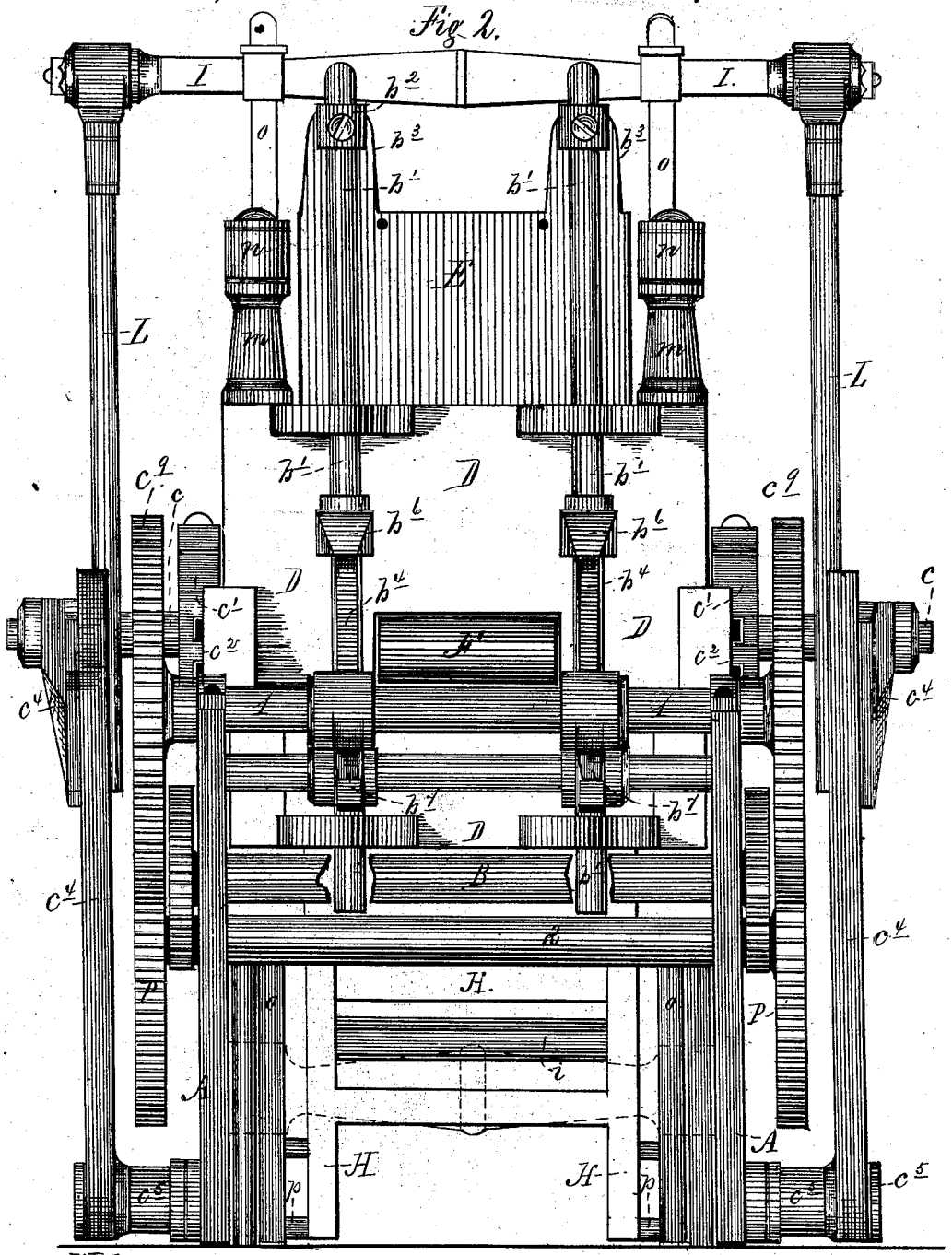
Fig 2.



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5 Sheets—Sheet 3.

T. C. KENWORTHY & A. McGREGOR.

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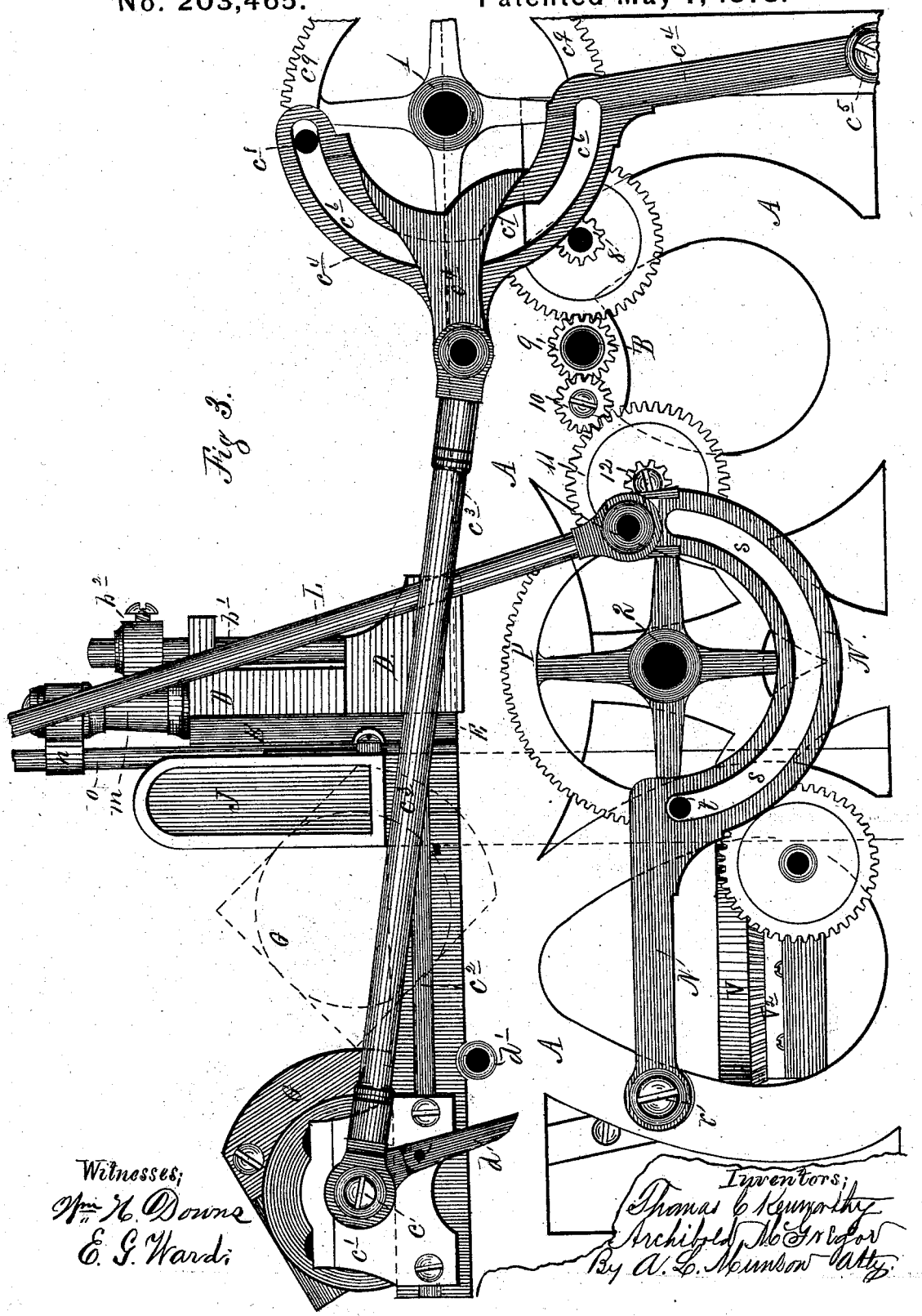

Fig 3.

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T. C. KENWORTHY & A. McGREGOR.

Plate-Printing Machine.

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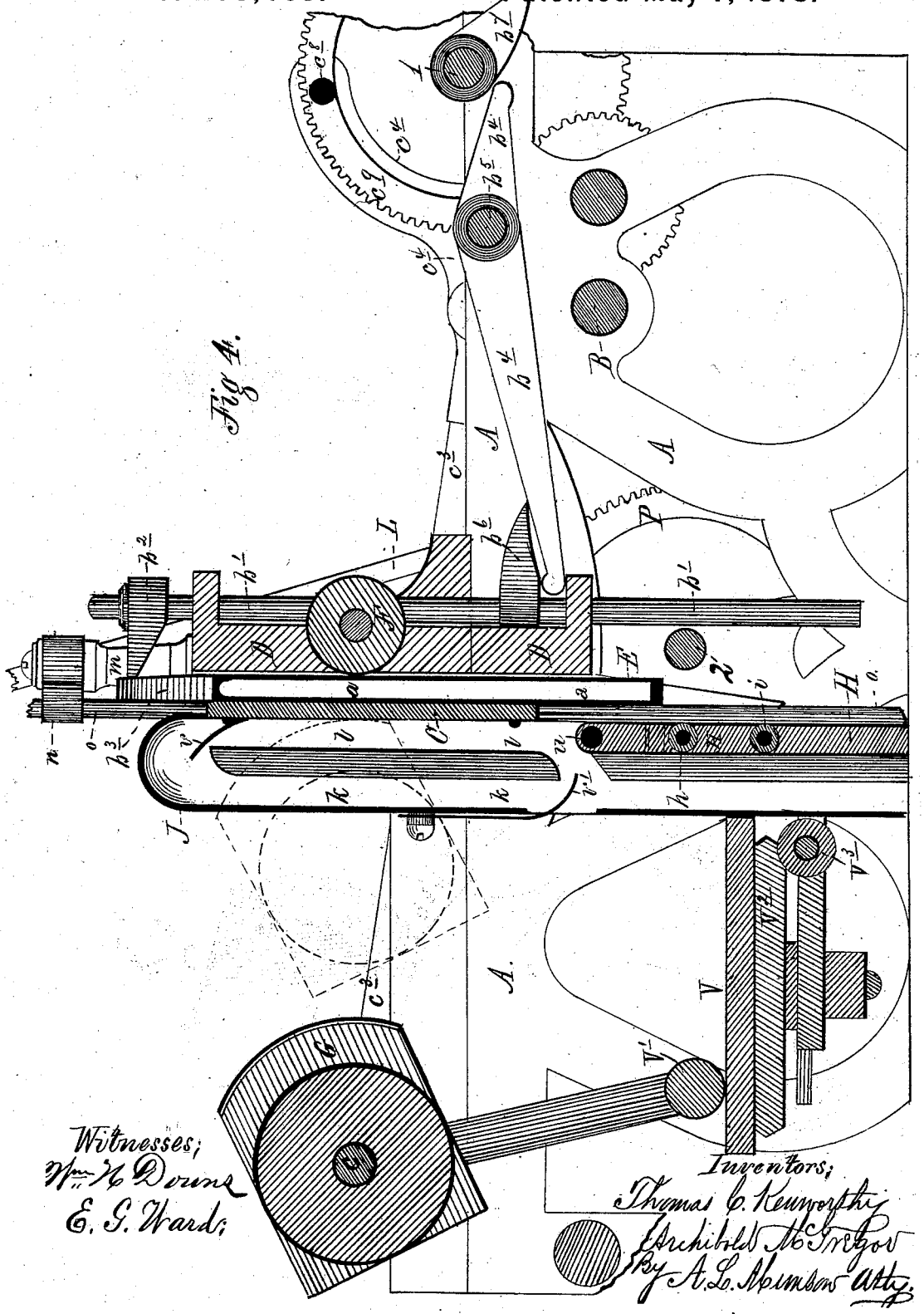

Fig 4.

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5 Sheets—Sheet 5.

T. C. KENWORTHY & A. McGREGOR.

Plate-Printing Machine.

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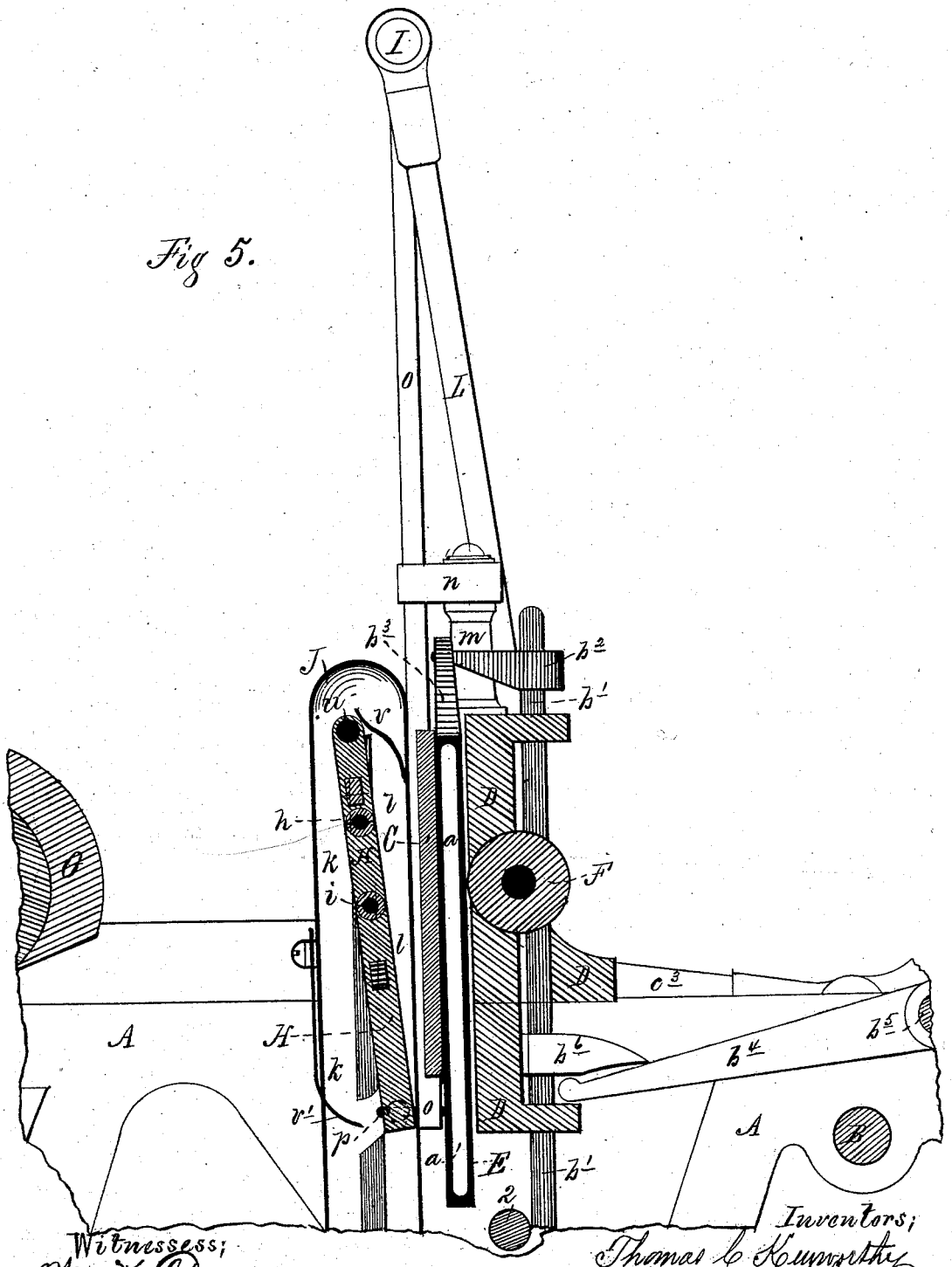
Fig 5.



UNITED STATES PATENT OFFICE.

THOMAS C. KENWORTHY AND ARCHIBALD McGREGOR, OF NEW YORK, N. Y., ASSIGNORS OF A PART OF THEIR RIGHT TO JOHN F. BAKER AND GEORGE W. CLARK, OF SAME PLACE.

IMPROVEMENT IN PLATE-PRINTING MACHINES.

Specification forming part of Letters Patent No. **203,465**, dated May 7, 1878; application filed December 1, 1877.

To all whom it may concern:

Be it known that we, THOMAS C. KENWORTHY and ARCHIBALD McGREGOR, both of the city, county, and State of New York, have invented certain new and useful Improvements in Plate-Printing Machines, of which the following is a specification:

This invention relates to that class of printing-presses designed solely for the purpose of taking impressions from finely-engraved steel and copper plates.

The apparatus, in the present instance, consists in the combination of several of the devices now used in the hand-presses with new devices, both being controlled and operated by certain mechanical devices, which combination of elements serve to produce a machine of great strength, capable of being run by power, and producing work of the finest quality in a rapid manner, all of which combination of parts and the method of applying and using them will be hereinafter fully pointed out and described.

In the accompanying drawings, which form an essential and important part of this specification, Figure 1 represents a front elevation of an apparatus in which our invention is fully embodied. Fig. 2 is a rear elevation. Fig. 3 is a side elevation, and Figs. 4 and 5 are longitudinal vertical sections of the same.

The same letters of reference marked on the several figures of the drawings will locate and point out corresponding parts of the mechanism.

The object of this invention is the production of a machine constructed and arranged to run by power, and thus be adapted for the rapid printing of the finest classes and grades of engraved work from steel and copper plates.

A represents the frame of the machine, which may be of any approved form of construction. B is the main or driving shaft, to which power is applied for operating the machine, and it also carries the balance-wheel and the usual forms of fast and loose pulleys. D is the bed of the machine, which supports the immediate parts of the apparatus arranged for taking the impression, and, owing to the great strain put upon it, it is made extremely heavy. It is bolted to the frame A in any secure and approved manner.

E is the "plank," which carries the engraved steel or copper plate C, which plate is bolted or otherwise secured upon the face thereof. This plank is constructed with a chamber, *a*, as shown in Figs. 4 and 5, for the purpose of permitting the introduction therein of a jet of live steam, in order that the plank and attached plate may both be heated. The introduction of such jet of steam may be by means of flexible pipes attached to its apex or base, as may be found to be most convenient.

The plank E is reciprocated vertically in ways cut for that purpose in the face of the bed D, and such motion is imparted to it by means of the vertical rods b^1 b^1, which at their apexes are provided with arms b^2, the forward ends of which are entered into the arms b^3, which project upwardly from the apex of the plank E. Motion is given to these arms by means of the oscillating levers b^4, which are hung on a rocking shaft, b^5, the forward ends of such levers playing beneath an arm or stud, b^6, attached to the rods b^1, the rear ends projecting to the rear of the shaft b^5, and are acted on by cams b^7, which are attached to the revolving shaft 1. A back roller, F, is hung in bearings in the body of the bed D, the face of such roller projecting through the bed, and the plank E riding thereupon during its reciprocating movements. This back roll serves to obviate the greater amount of the friction that would otherwise be met with if the plank moved in the ways in the bed under great pressure. The introduction of this roll therefore renders the movements of the plank easy, without regard to the amount of pressure that may be placed upon the plank when impressions are being made.

G is the impression-roll, which is a complete roller, or such section thereof as may be necessary for the purpose. It is hung on a shaft, *c*, which is journaled in bearings in a sliding carriage, c^1, which is mounted and reciprocates in ways c^2 cut longitudinally in the side of the frames A at its apex. This impression-roller

has two distinct motions—a longitudinal reciprocating with its carriage c^1 and a rocking movement. The first-named movement is accomplished by means of the connecting-rods c^3, attached at their forward ends to the shaft c, which projects laterally from the sides of the sliding carriage c^1, the rear ends of such connecting-rods c^3 being attached to the face of an upright cam-lever, c^4, such lever being pivoted at its base on a stud, c^5, projecting from the base of the frame A. This lever c^4 is shaped as shown in Fig. 3. It is provided with a slot, c^6, (see Fig. 3,) which extends for one-half of the circle on the line of which it is cut, a portion of such slot being enlarged and cut away on the line of a small circle, as shown at c^7. This cam-lever c^4 is controlled in its movements by a traveling pin, c^8, which projects from the side of the gear c^9, which is attached to the shaft 1.

Its motion is as follows: The position of the various parts being as shown in Fig. 3, a revolving movement being imparted to the shaft 1, the pin c^8, carried by the gear c^9, follows in the slot c^6 until it reaches the termination thereof, when its movement necessarily throws the cam-lever c^4 to the rear, the pin c^8 following slot c^6 until it reaches the base of that portion of the slot cut away at c^7, this part of the slot being enlarged on a perfect circle of such diameter as will permit the pin to loose its gripe on the cam-lever, permitting it to stand still until the pin again enters the main slot c^6, when it at once throws the cam-lever forward to its first position. This movement of the cam-lever c^4 results in reciprocating the carriage of the impression-roller, and at the termination of its forward movement holds it at a stand-still for one-eighth of the revolution of the shaft 1, gear c^9, and pin c^8, during which time the desired impression is taken from the plate; and after the impression-roller has been retired to its first position it is held motionless during one-half the revolution of the pin c^8 with the gear c^9, and the entire length of the slot c^6, this last stand-still being necessary to permit the plate to be inked, cleaned, and polished preparatory to taking the impression.

Several of the parts thus described are necessarily duplicated on the opposite side of the frame, both sets operating in unison.

The rocking movement of the impression-roller is provided for as follows: The shaft c, on which it is mounted, rocks freely in its bearings, and at the right-hand end thereof, (or at the left or at both ends, if preferred,) which projects beyond the sliding carriage c^1, is hung a depending lever, d, which is permitted to swing freely in one direction, forward only, its rear motion being cut off. As the carriage c^1 moves forward this lever strikes against the pin d', which projects from the side of the frame A. This obstruction, acting on the lever d, causes the shaft c to rock until the lever d clears the pin d'. This results in bringing the impression-roller G into the position at the extreme of its forward movement, as shown in the dotted lines in Fig. 3, which position is attained just prior to the beginning of the upward movement of the plank E, which at this juncture is made to rise, carrying the plate C; and as the impression-roller G is pressing hard against the face of the said plate, it necessarily rocks in unison with the movement of the plank and plate until such rocking motion ceases by the termination of the contact, when the impression-roller is in the position as shown by the dotted lines in Fig. 4, at which point it is retired to its original position, the plank, with the plate, also being dropped to its first position. As the carriage c^1 retires the lever d strikes against the pin d', gives way on its hinged bearing, rides loosely over said pin, and, clearing it, drops by its own weight into its normal position.

The process of inking the engraved portion of the steel or copper plate, the removal of the surplusage of ink from the face of the plate, and the polishing thereof prior to taking an impression therefrom, are accomplished substantially as follows:

H is the carriage, carrying the inking-roll h and cleaning-roll i, and such other additional rolls as may be deemed necessary to the proper execution of the work. It has a vertical reciprocating motion in ways k and l, which are cut on the interior face of the standard-frames J, which are attached to the inside face of the framing A.

The movement of the carriage H is accomplished as follows: To the apex of the two stands m, attached to the top of the bed D, are affixed projecting arms n, through which connecting-rods o o pass and are guided. The bases of these rods o o are attached by suitable pins p to the base of the carriage H, their apexes being secured to a cross-bar, I. To both ends of this cross-bar I connecting-rods L are attached, the lower ends of such rods being secured to the end of an oscillating cam-lever, N, whose rear end is pivoted on a projecting stud, r, attached to the frame A. This cam-lever has a slot, s, in length equal to one-half the circumference of a circle drawn on a line of which the pin t is the extreme. Into this slot s the pin t enters and plays, such pin projecting from the side of the geared wheel P and revolving therewith, said gear being secured on the shaft 2. As the shaft 2 and gear P revolve, carrying the pin, (the position of the parts being as shown in Fig. 3,) it follows in the curved slot in lever N until it reaches the end thereof, when its continued motion necessarily lifts the cam-lever until the pin t passes over the apex of its path, from which point the lever commences to fall until it regains its first position, where it remains at rest during the time the pin is traveling one-half the revolution of the gear P, and again reaches the end of the slot.

This movement of the cam-lever N lifts the connecting-rods L, and, through the medium of

the lever-rods *o o*, the inking-carriage H. As the carriage H is lifted, its inking-roll *h* deposits on the face of the plate a coating of ink, while the cleaning-roll *i*, following, removes all surplusage and cleans the face of the plate, leaving ink only in the cut or engraved portion thereof. Additional cleaning and polishing rolls may be introduced into the carriage H for insuring the proper production of the work.

The top of the side frames of the carriage H is provided with guiding-pins *u*, which enter into the slots *l*, guiding the carriage in its movements. As these pins reach the apex of the slot *l* they are, by the action of the springs *v*, forced to the rear into the slots *k*, the guide-pins at the base of the frame remaining in the slots *l*. This action results in the retiring of the rolls from contact with the face of the plate, the inking-carriage taking the position as shown in Fig. 5. The downward movement of the carriage then takes place, and continues until the pins *u* reach the base of the slots *k*, when they are, by the action of springs *v'* forced back again into the slot *l*, taking its first position, as in Fig. 4, ready for a repetition of the movement.

The extremes of the rib dividing the slots *k* and *l* are, at apex and base, cut in curved form, to facilitate the proper directing of the guiding-pins in moving from one slot to the other. The object of this arrangement is to take the inking and cleaning rolls away from the face of the plate during the return movement of the inking-carriage. The inking-roller *h* may take its supply of ink from an auxiliary delivering-roll in any of the usual forms as adopted for use in printing-presses. The arrangement shown in the drawings is a convenient method; but we do not limit ourselves to that particular form.

V is the revolving ink-table; V^1 the take-up roll, which is carried forward to deliver ink to the roll *h* in the inking-carriage H, the table V being rotated by suitable gearing V^2 V^3, receiving an impulse by means of suitable gearing and connections with the other operating parts of the apparatus. The various driving-shafts and operating parts are all driven by means of suitable train of gearing 8, 9, 10, 11, and 12, the main impulse being derived from the main shaft B.

The operation of the apparatus is as follows, the various parts being in the position as shown best in Figs. 3 and 4: Motion being imparted to the driving-shaft B, the inking-carriage is lifted, as described, depositing the ink upon the face of the plate, the cleaning and polishing rolls also operating as set forth. This action completed, the carriage retires the rollers from their contact with the plate, and is dropped into its original position. The impression-roller is now advanced (the sheet of paper upon which the impression is to be printed being placed in proper position thereupon, and guided and retained in place by any of the well-known devices usually adopted for that purpose) until it comes in contact with the plate, the position taken at this juncture being shown in dotted lines in Fig. 3. The plank carrying the plate is then lifted, as described, the pressure between the plate and the impression-roller being so great that the movement of the plank causes the impression-roller to rotate in unison therewith as the upward movement of the plank takes place, and such rotation continues until the extreme of the movement of the plank is reached, when the impression-roller is in the position as shown by the dotted lines in Fig. 4, at which point it is released from its contact with the plate, and the printed sheet of paper can be removed.

It is obvious that the sheet of paper is drawn through by these movements, and that the impression taken from the plate is a gradual one, as the impression-roll rotates, and that but a portion of the plate is being used, and that at the point of impact between the periphery of the impression-roller and the face of the plate. This is substantially the same result as attained in the hand-press, and has all of the advantages found therein.

Having thus fully described our invention, what we claim as new, and as our invention, is—

1. In a plate-printing press, the combination of the following instrumentalities: a plank or bed having a positive reciprocating movement, and carrying upon its face the plate from which the impression is to be taken; an impression-roller, or segmental section thereof, having the following stated movements: first, a forward movement, which advances it to contact with the plate, during which movement it is rocked on its shaft preliminary to its impact with the plate; second, a rocking movement on its shaft in unison with the movement of the bed and its plate while the impression is being taken; third, a retiring movement, after its contact with and at the completion of the rise of the bed and plate; a device for applying ink to the plate and for cleaning and polishing the same, such device reciprocating between the bed and impression-roller; and mechanism for operating such instrumentalities in unison, all substantially as and for the purposes as herein shown and described.

2. The combination, in a plate-printing press, of the following instrumentalities: a plank or bed having a positive reciprocating movement, and carrying upon its face the plate from which the impression is to be taken; an impression-roller, or segmental section thereof, having the following stated movements: first, a forward movement, which advances it to contact with the plate, during which movement it is rocked on its shaft into position for its impact with the plate; second, a rocking movement on its shaft in unison with the rise of the bed and plate while the impression is being taken; third, a retiring movement after its contact with and at the completion of the rise of the bed and plate; a device for applying

ink to the plate and for cleaning and polishing the same, such device reciprocating between the bed and impression-roller, and at the completion of its movement retiring from the plate and returning to its first position without touching the plate; and suitable mechanism for operating such instrumentalities in union, all arranged, applied, and operating substantially as and for the purposes as herein shown and set forth.

3. In a plate-printing press, the combination of the following instrumentalities: a plank or bed having a positive reciprocating movement, and carrying upon its face the plate from which the impression is to be taken; an impression-roller, or segmental section thereof, having stated movements, as follows: first, a movement advancing it to contact with the plate, during which movement it is rocked forward on its shaft prior to its impact with the plate; second, a rocking movement on its shaft in unison with the rise of the bed and plate while the impression is being taken; third, a retiring movement after its contact with and at the completion of the rise of the bed and plate; a device for applying ink to the plate and for cleaning and polishing the same, such device reciprocating between the bed and impression-roller; a back roller hung in the frame in which the bed is reciprocated and upon which the bed rides during its movements; and mechanism for operating such instrumentalities in unison, all substantially as and for the purposes as herein shown and set forth.

4. The combination of the plank E, either hollow or solid, moving in ways cut in the bed D, and operated by means of rods b^1, levers b^4, and cams b^7, roller F, impression-roller G, reciprocated by means of levers c^3 and cam-lever c^4, and oscillated by means of depending arm d and pin d', also by contact with the moving plank E and inking-carriage H, moving in ways k and l cut in stands J, and operated by means of rods o o, lever L, and cam-lever N, all arranged, applied, and operating as and for the purposes as herein shown and set forth.

5. The combination of the reciprocating inking-carriage H, having guide-pins n at the apex, moving in ways k and l cut in the stands J, actuating-springs v and v', by means of which said carriage is thrown alternately from and to the impression-plate C, and the levers o o, attached to the base of the carriage, by means of which said carriage is actuated, all substantially as and for the purposes herein shown and set forth.

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