S. O. EDMONDS.

PRINTING MACHINE.

APPLICATION FILED MAR. 11, 1908.

1,031,329.

Patented July 2, 1912.

6 SHEETS—SHEET 1.

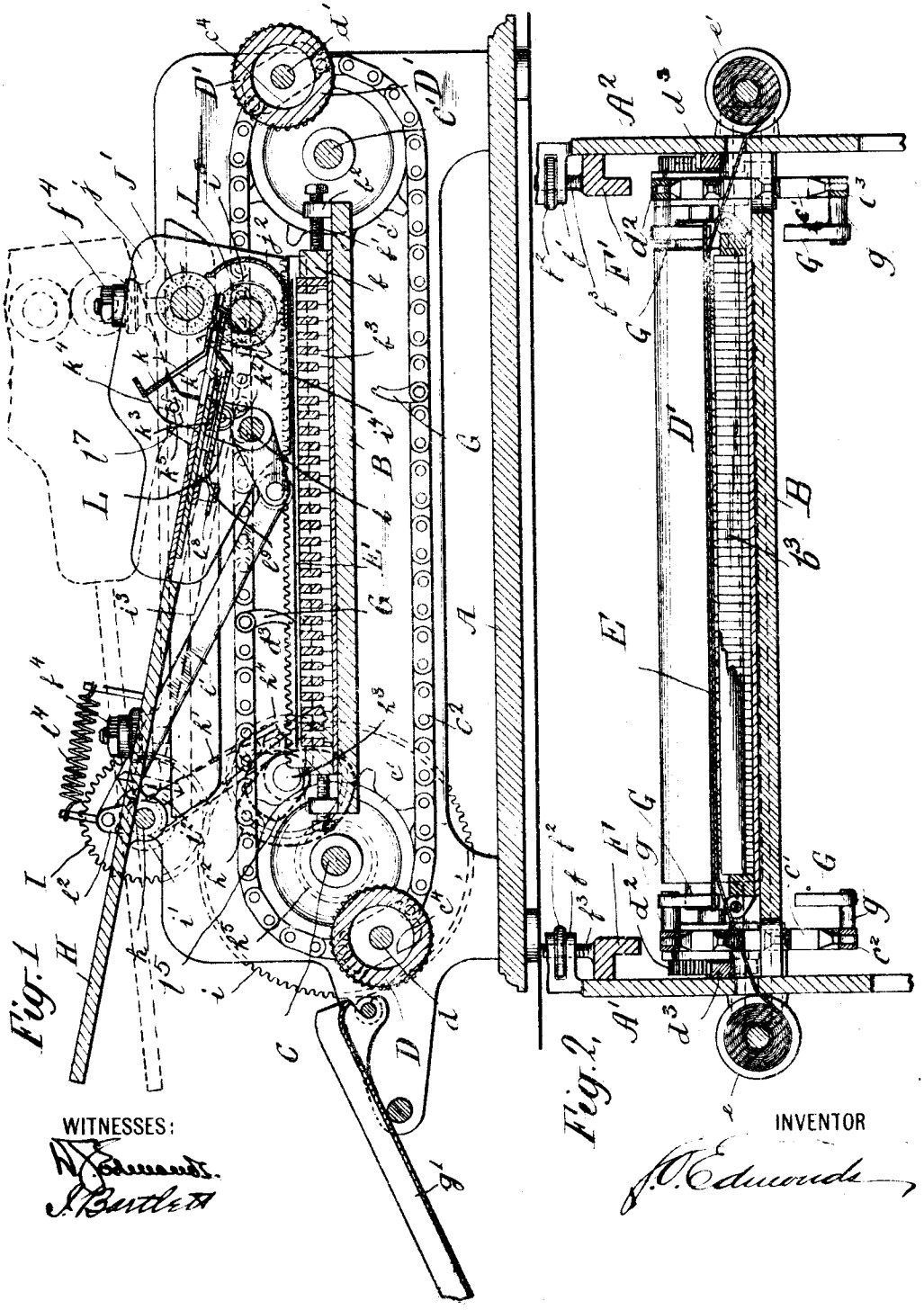

Fig. 1

Fig. 2.

WITNESSES:

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6 SHEETS-SHEET 2.

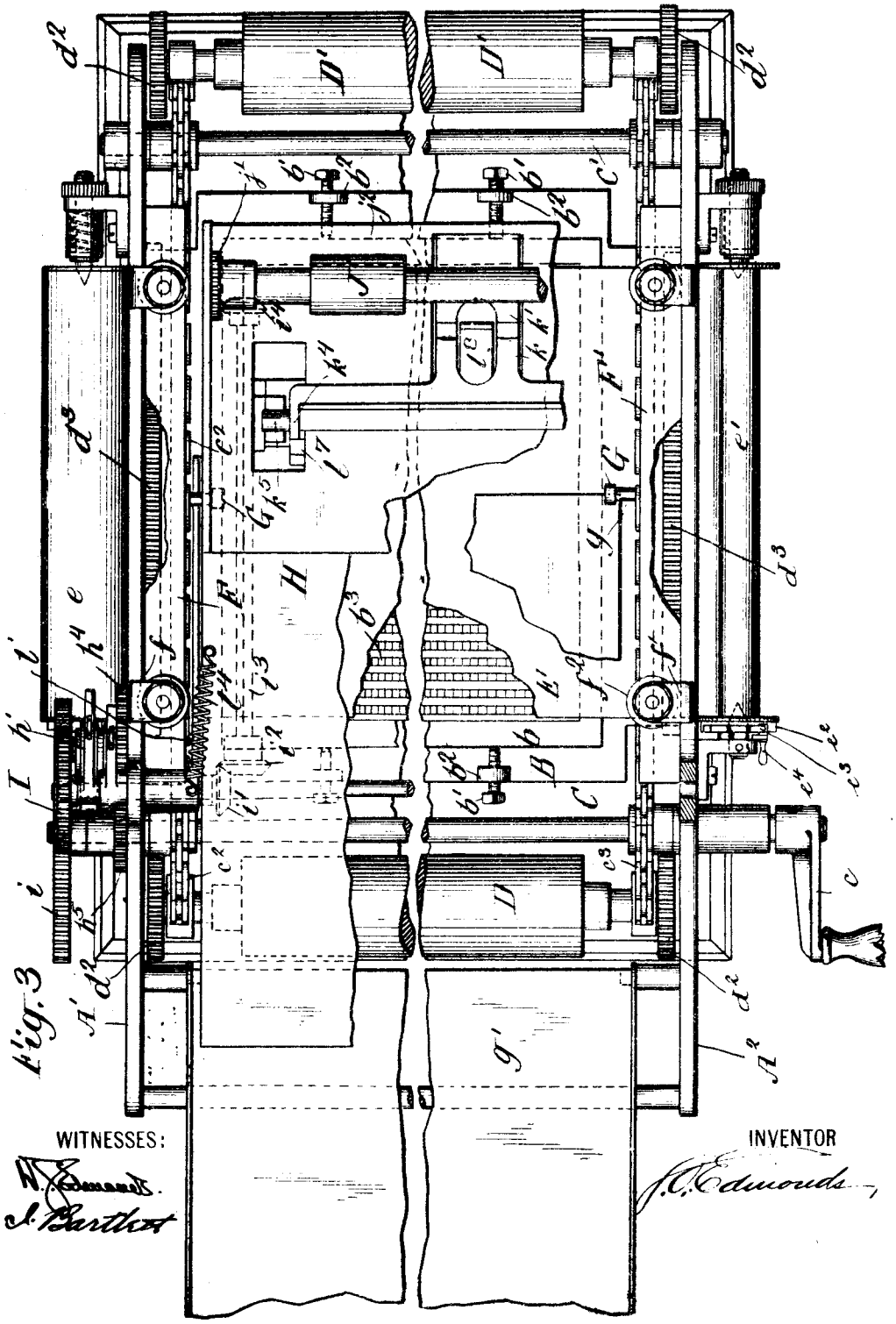

Fig. 3

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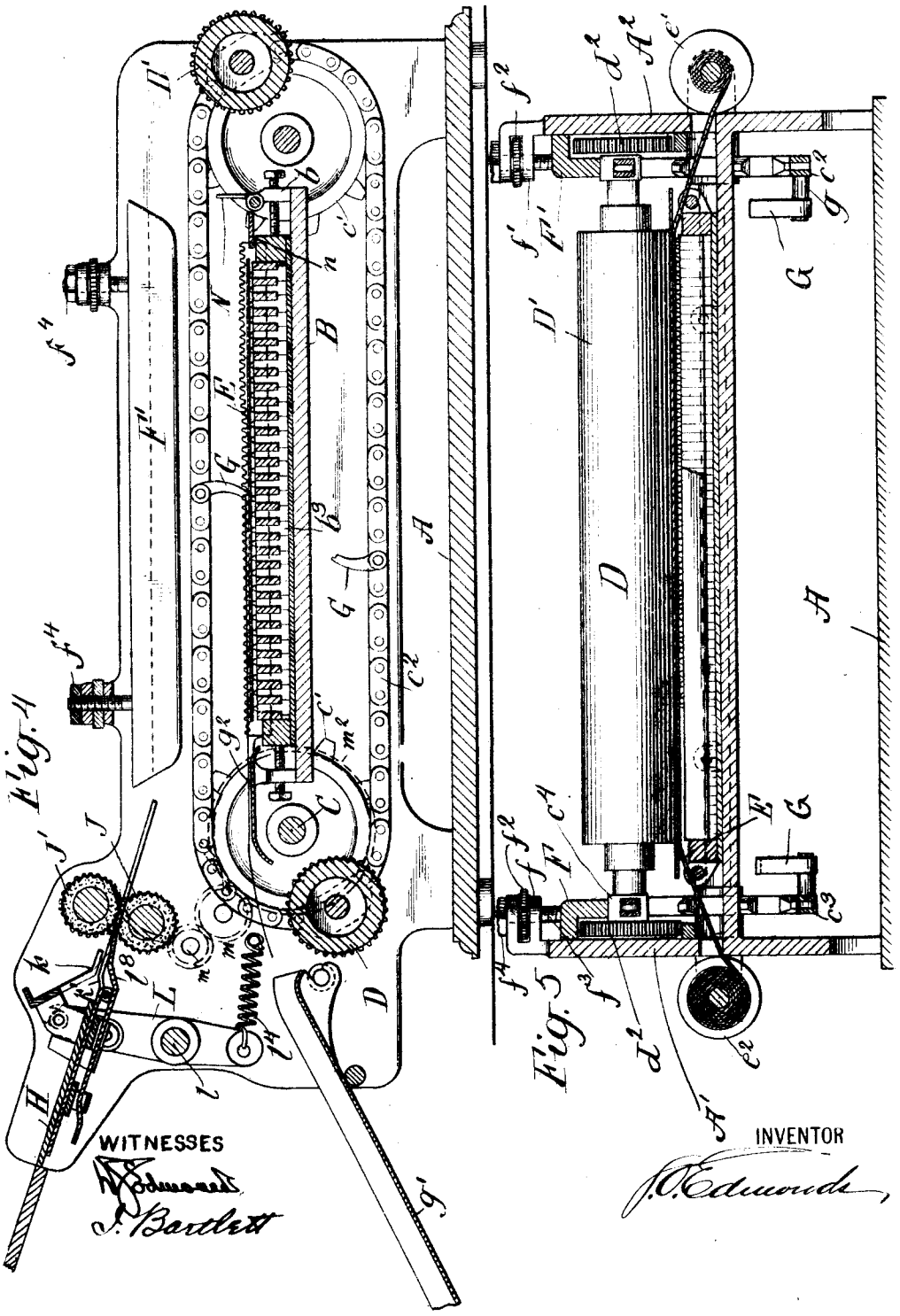
6 SHEETS—SHEET 3.



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6 SHEETS—SHEET 4.

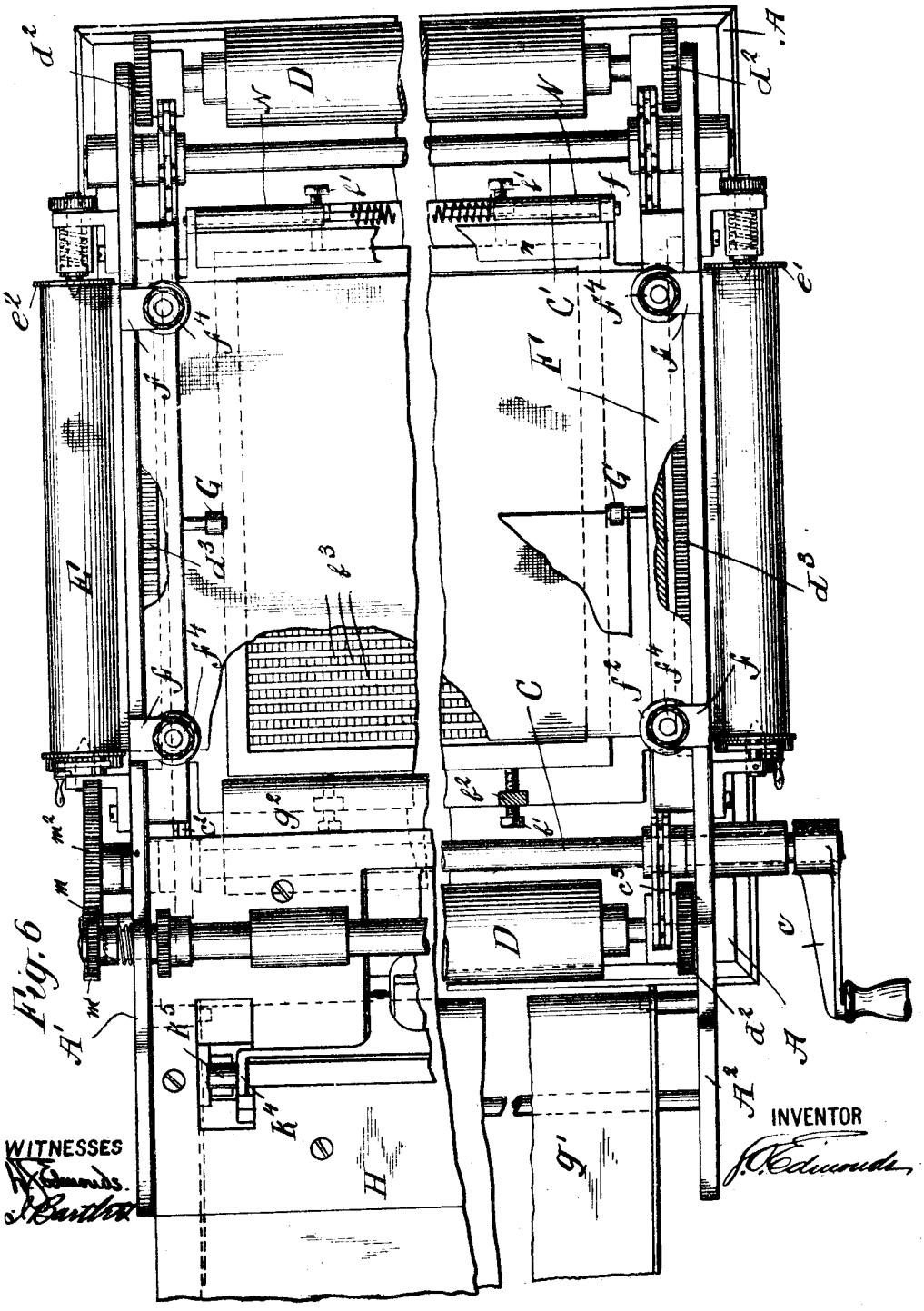

Fig. 6

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6 SHEETS—SHEET 5.

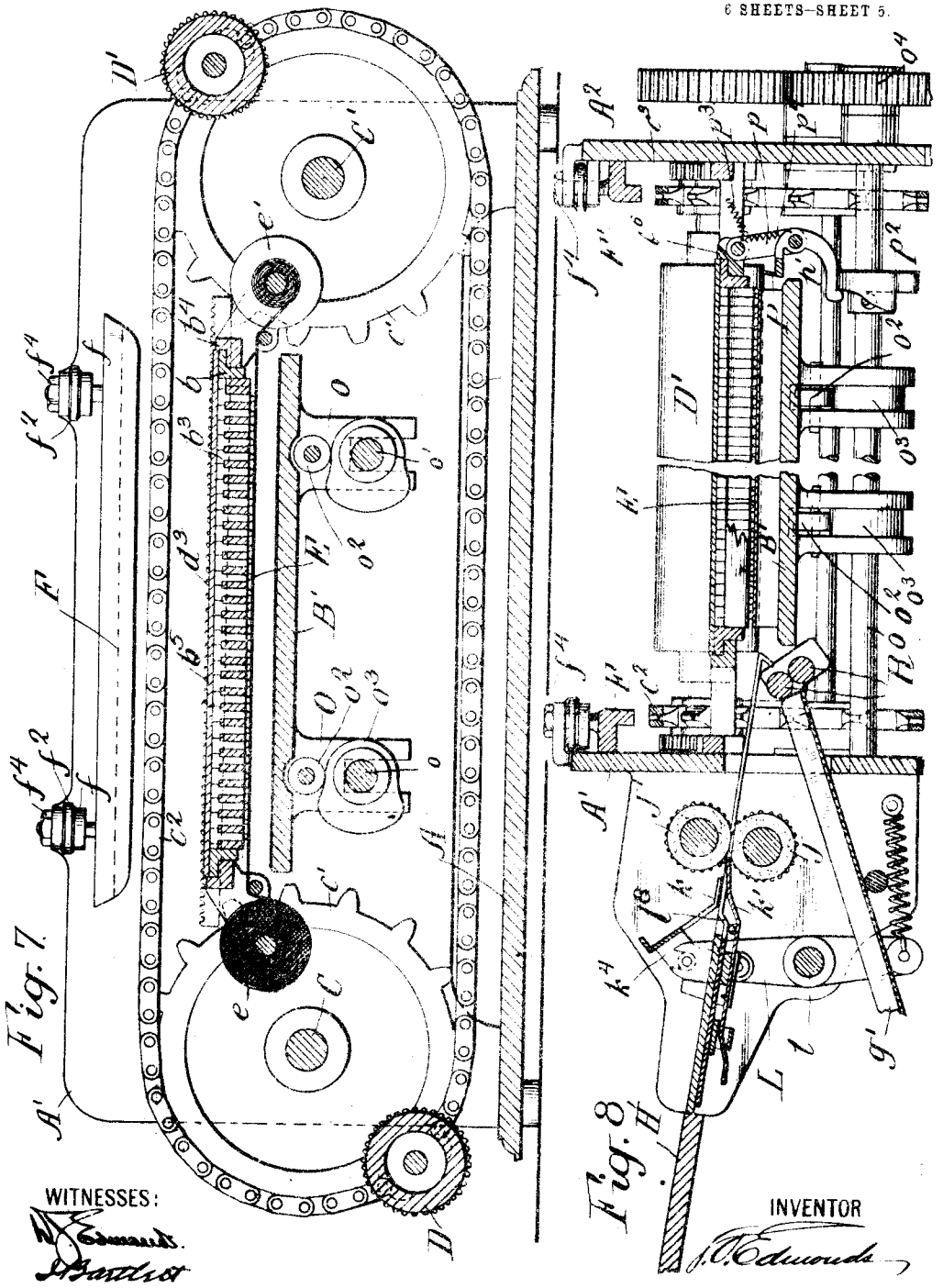

Fig. 7.

Fig. 8.

WITNESSES:

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6 SHEETS--SHEET 6

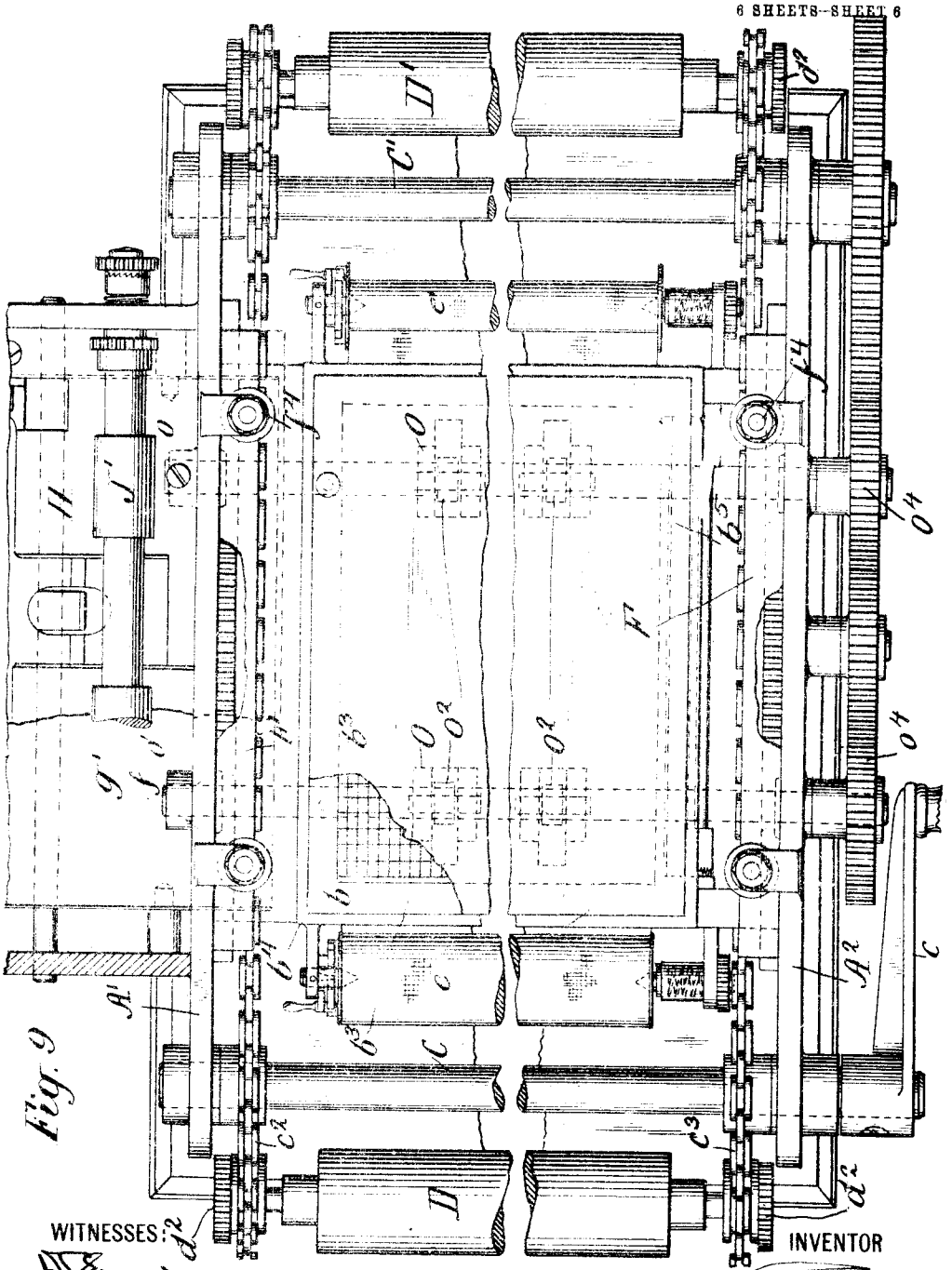

Fig. 9

WITNESSES:

INVENTOR

UNITED STATES PATENT OFFICE.

SAMUEL OWEN EDMONDS, OF NEW YORK, N. Y., ASSIGNOR TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PRINTING-MACHINE.

1,031,329. Specification of Letters Patent. Patented July 2, 1912.

Application filed March 11, 1908. Serial No. 420,394.

To all whom it may concern:

Be it known that I, SAMUEL O. EDMONDS, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented a certain new and useful Improvement in Printing-Machines, of which the following is a specification.

This invention relates to printing machines for printing multiple copies of letters, circulars and the like.

The invention is directed to the provision of a printing machine for office use, which is small, compact and inexpensive to manufacture, which may be run by an unskilled operator and which is capable of printing in imitation of typewritten work.

In accordance with the invention, a page-form of type is employed, with which a roller coacts to effect the printing, this roller being either a pressure-roller or a combined pressure- and platen-roller. The inking is effected by an ink-ribbon, which passes between the printing faces of the type and the impression-sheet, the ends of this ribbon being preferably carried on spools mounted at opposite sides of the page-form of type and intermittently rotated automatically during the operation of the machine, in order to present new surfaces for successive impressions, since with such an ink-ribbon results are obtained which are in close simulation of typewritten work. The pressure-roller above mentioned is arranged to have a movement in a straight line to effect the printing, and then to be moved back to its original position while out of cooperative relation to the type. In order to make the machine more compact, the pressure-roller is preferably moved to effect the printing on one side of the page-form of type and is then carried to the other side of the page-form for its return movement, such movement of the roller being preferably effected by mounting the roller on chains which travel over sprocket-wheels arranged one pair at each end of the page-form of type. To increase the capacity of the machine, two pressure-rollers may be so mounted upon a single pair of chains, so that while one roller is printing upon a sheet the other roller is making the return movement to its initial position. With the machine thus constructed, there is preferably combined suitable sheet-feeding apparatus, which may be partially or entirely automatic in its operation, in order to insure the proper feeding of the sheets, so that the impressions received thereby will be in the desired position upon the sheets. Also, delivery mechanism may be employed for removing the sheets as soon as the impressions are received thereby, this mechanism being preferably entirely automatic.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of the machine; Fig. 2 is a transverse section of the same; Fig. 3 is a plan view of the machine broken away and sectioned in part; Figs. 4, 5 and 6 are views similar to Figs. 1, 2 and 3, respectively, illustrating a modification; and Figs. 7, 8 and 9 are views similar to Figs. 1, 2 and 3, illustrating a further modification.

Referring first to Figs. 1, 2 and 3, the machine consists of a base A, on which are mounted side-frames A' and A^2, these side-frames having a support B secured thereto, for a page-form of type. In the drawings, I have shown a chase b locked upon the support B by bolts b' passing through threaded openings in offsets b^2 on support B, this chase b being provided with a plurality of parallel slots or type-channels to receive the type b^3, as shown in Figs. 1 and 3. Extending between the side-frames A', A^2, and mounted for rotation in bearings therein, are two shafts C, C', these shafts being located adjacent to the opposite ends of the support B. Shaft C is extended at one end through the side frame A^2 and carries an operating handle c by which the shaft may be rotated. Each of the shafts C and C' has two sprocket-wheels c' secured thereon adjacent to the side-frames A', A^2, and chains c^2, c^3 run on the corresponding sprockets c' on the two shafts C, C', as shown in Fig. 3. Two of the links c^4 in each of the chains c^2, c^3, are formed to provide bearings for the ends of shafts d, d', which extend between the two chains and are rotatably carried thereby. The shaft d carries a pressure-roller D, and the shaft d' a similar pressure-roller D'. At each end, each of the shafts d, d', is extended through its bearing and carries a gear d^2 which is of the

same diameter as the roller carried by the shaft, and each of these gears is adapted to mesh with a rack d^3 mounted upon the side-frames A′ A². It will thus be seen that by rotating the operating handle c, the shaft C and the sprockets thereon, together with the shaft C′ and the sprockets thereon, will be rotated, causing movement of the chains c^2, c^2 and the rotatable rollers D, D′, carried thereby: that this movement of the chains causes the rollers D, D′, to move periodically over the upper face of the page-form of type and to be then returned beneath the page-form of type; and that during the movement of each roller over the page-form of type that roller will be positively rotated, due to the coaction of the gear d^2, corresponding to that roller, with the rack d^3. If desired, rack d^3 may be considerably shorter than it is shown to be as the positive rotation of the roller is of special utility only when the coaction of the roller with the printing faces of the type begins.

When the pressure-rollers D, D′ are passing over the type and effecting the printing of an impression, they are held against rising from the type so that the entire impression is uniformly printed. For this purpose, cams F, F′ are secured to the side-frames A′, A², directly over the chains c^2, c^2. These cams coact with the bearings c^4 for the shafts d, d', and as the operative surfaces of these cams are perfectly straight, the bearings c^4, together with the shafts d, d', and rollers D, D′ carried thereby, must move in a straight line while coacting with the printing faces of the type. The cams F, F′, are preferably adjustable vertically, in order to permit of regulating the pressure of the rollers D, D′, upon the impression-sheet. For this purpose, each of the side-frames A′, A², is provided with two offsets f, f', these being bifurcated as shown in Fig. 2, to receive a thumb-nut f^2 between the two portions thereof. Each of the cams F, F′, has two threaded studs f^3 extending upwardly therefrom and passing through the openings in the offsets f, f' and the threaded openings in the nuts f^2. Thus, by turning the nuts f^2 the vertical positions of the cams F, F′, may be adjusted as desired. When the desired position of these cams has been reached, they may be locked against further movement by lock-nuts f^4.

An ink-ribbon E, of a width sufficient to overlie the entire page-form of type, is arranged to extend over the printing faces of the type, as shown in Fig. 2, the ends of this ribbon being carried by spools e, e'. During the printing operation, this ribbon is fed along in the direction of its length in any suitable manner, so as to present new surfaces for the printing of successive impressions. This ribbon-feeding mechanism is not illustrated in detail, as any suitable mechanism may be employed for this purpose, this mechanism preferably including a ratchet wheel e^2 on the end of each of the spools e, e', and a pawl e^3 coacting with this ratchet. The two pawls e^3 on opposite sides of the machine are preferably connected, so that one may be thrown into and the other out of operative relation, in order to reverse the direction of feed of the ribbon, a handle being shown at e^4 by which this reversal of feed may be effected manually.

While a sheet is being imprinted upon, it rests upon the portion of the ink-ribbon E which directly overlies the printing faces of the type, and after the sheet has been imprinted upon it is automatically removed from the machine. Any suitable mechanism may be employed for this purpose, but that which I prefer to use consists of fingers G secured to and depending from rods g which extend inwardly from certain of the links of the chains c^2, c^2. A pair of fingers G are mounted upon the chains c^2, c^2, corresponding to each of the pressure-rollers D, D′, and these fingers are arranged at such a distance in rear of the corresponding roller that they come into coaction with a sheet immediately after the roller has passed beyond the edge of that sheet. The paths of the fingers G are shown in Figs. 2 and 3, from which it will be seen that these fingers move along at opposite sides of the page-form of type. At these points, the ink-ribbon E is carried down slightly below the surface of the printing faces of the type, so that as the fingers G move along, their ends will pass over the edge of the ink-ribbon E but will catch the edge of the impression-sheet. When the sheet is thus caught by the ends of the fingers G, it will be moved along in correspondence with the movement of the fingers until it is removed from the printing position, the sheet passing into a delivery tray g' mounted upon the side-frames A′, A². I also provide means for feeding the sheets to the printing position. In the preferred embodiment of my invention, this consists of a feed-board H, which is loosely mounted on a shaft h extending between the side-frames A′, A². This feed-board is arranged to be reciprocated about shaft h to carry its forward edge downwardly close to the type-form while a sheet is fed to the printing position, and then raise its forward edge and hold it in the raised position while the pressure-roller D or D′ prints upon the sheet thus fed. This reciprocation of the feed-board H is effected by an arm h' secured thereto and extending downwardly into coaction with a cam h^2 secured upon a stub-shaft h^3. This stub-shaft is mounted for rotation in a bearing formed in the side-frame A′ and is driven by a gear h^4 secured thereto and meshing with a gear h^5 secured upon the shaft C.

The ratio of the number of teeth on gears h^4 and h^5 depends upon the number of pressure-rollers D, D', employed; in the present instance, as two such pressure-rollers are employed, the gearing h^4 and h^5 is so arranged as to rotate shaft h^3 through two complete revolutions while one of the pressure-rollers makes one complete printing movement, including a forward, operative movement and a return, inoperative movement. As shaft h^3 and the cam h^2 secured thereon make one complete revolution, the feed-board H will be moved from the operative position in which it is shown in full lines in Fig. 1, to the inoperative position in which it is shown in dotted lines in that figure, and then back to the operative position.

Secured upon the shaft h is a gear I meshing with a gear i secured upon the shaft C. Also secured on shaft h is a bevel-gear i' meshing with a similar bevel-gear i^2 secured upon the end of a shaft i^3 journaled in bearings depending from the under side of the feed-board H. At its opposite end, shaft i^3 carries a bevel-gear i^4 meshing with a bevel-gear i^5 secured to a sectional sheet-feeding roll J. This roll J is mounted for rotation in bearings formed in frame-pieces j which are secured to opposite edges of the feed-board H. The upper surface of the sections of roll J is flush with the upper surface of the feed-board H, and the sections of this roll are adapted to coact with similar sections on a feed-roll J' directly overlying the roll J and similarly mounted for rotation in bearings formed in the frame-pieces j. Rolls J and J' are geared together by gears j' secured upon the ends thereof. It will thus be seen that during the operation of the machine the feed-rolls J, J' are continuously rotated, so that if the edge of a sheet is inserted between these feed-rolls that sheet will be fed forwardly. A guide j^2 is mounted upon the frame-pieces j opposite the line of coaction of the feed-rolls J, J', and so arranged that when the sheet is fed forward by these rolls it will be curled downwardly by the guide j^2 and caused to move over the type-form and the ink-ribbon overlying the same.

In order to insure the feed of the impression-sheets at the proper times with reference to the positions of the other parts of the machine, I provide means automatically operated intermittently for moving a sheet forwardly over the feed-board H until its forward edge is gripped by the feed-rolls J, J', whereupon the sheet is released and its further movement effected by the sheet-feeding rolls. This means consists of upper and lower gripping-fingers k, k', respectively, which are adapted to be brought together to grip a sheet between them and then to be moved forwardly until the ends of the fingers enter the spaces between the sections of the rolls J, J', and the edge of the sheet is gripped by the rolls, whereupon the fingers are again separated to release the sheet. The upper gripping-fingers k are pivotally connected at k^2 to a bar k^3 underlying the feed-board H, and the lower gripping-fingers k' are secured to this bar k^3, openings being provided in the sheet-metal portion of the feed-board H through which the ends of these fingers may project as shown in Fig. 3. On the upper ends of downwardly turned arms k^4 which carry the fingers k and which are pivoted at the lower ends to bar k^3 are trunnions k^5 which are received in notches cut in the upper ends of levers L secured upon a shaft l extending between and pivotally mounted in the side-frames j of the feed-board. One of the levers L is extended below shaft l and is connected by a link l' to the upper end of a lever l^2 loosely mounted upon the shaft h. The lower end of lever l^2 extends downwardly from shaft h and coacts with a cam l^5 secured upon the shaft h^3. A spring l^4 acts on lever l^2 in a direction to hold its lower end in contact with the periphery of cam l^5. Thus, as shaft h^3 rotates, the cam h^2 thereon permits the feed-board H to turn to the operative position, in which it is shown in full lines in Fig. 1, and immediately thereafter the cam l^5 operates lever l^2 and link l' to rock the levers L about their pivots in a direction to carry the upper ends of those levers to the right in Fig. 1. This movement of the upper ends of levers L and the trunnions k^5 carried thereby first causes the upper gripping-fingers k to turn about the pivotal connection k^2 until the ends of the upper gripping-fingers k come down upon a sheet and grip the sheet between them and the lower gripping-fingers k'. Since the further turning movement of the gripping-fingers k about the pivotal connection k^2 is then precluded, the further movement of the upper ends of levers L to the right in Fig. 1 causes the upper gripping-fingers k, the bar k^3 to which they are connected, and the lower gripping-fingers k' which are secured to bar k^3, to move bodily to the right and to carry with them the sheet which is gripped between the two sets of fingers, until the edge of this sheet is gripped by the feed-rolls J, J'. Just as this occurs, the cam l^5 permits the lever l^2 to move in the opposite direction under the influence of spring l^4, thus rocking the levers L in the opposite direction, that is, in the direction to carry their upper ends to the left in Fig. 1. At the beginning of this backward movement, the upper gripping-fingers k are turned about the pivotal connection k^2 so that the sheet is released by the gripping-fingers, such turning movement of the upper gripping-fingers being arrested, immediately

after the sheet is released, by stops l^5 secured to the bar k^3 and extending upwardly therefrom, directly in rear of the arms k^4 carrying the gripping-fingers k. Thereafter, the further movement of the upper ends of levers L to the left in Fig. 1 moves the two sets of gripping-fingers back to their initial position.

Preferably a stop is employed for assisting in positioning the impression-sheet with reference to the gripping-fingers k, k', so that when a sheet is moved forward manually over feed-board H, it will be arrested when it reaches the proper position. For this purpose, each of the lower gripping-fingers k' is slotted, as shown in Fig. 1, and a stop-finger l^6 is pivotally mounted upon the bar k^3 directly under each of the lower gripping-fingers k'. At its forward end, each of the fingers l^6 is turned upwardly as shown. Near its rear end, each finger l^6 is bent so as to form therein a portion lying at an incline to the body portion of the finger and adapted to coact with a strip l^9 depending from the under side of the feed-board H. It will thus be seen that when the gripping-fingers k, k' are in the rearward position, the fingers l^6 will turn by gravity about their pivots until the up-turned ends thereof project above the surface of the feed-board H and serve as stops limiting the forward movement of an impression-sheet over the feed-board; but when the gripping-fingers are moved forwardly, the strip l^9 coacts with the inclined portions of the fingers l^6 to rock these fingers about their pivots sufficient to carry the up-turned ends thereof downwardly below the surface of the feed-board H.

In the operation of the machine, a sheet is fed over the feed-board H until its movement is arrested by the up-turned ends of the fingers l^6, and the shaft C is then rotated by means of its operating handle. The cam l^5 on the shaft h^3 geared to shaft C operates the sheet-forwarding mechanism above described, to cause the two sets of gripping-fingers k, k' to grip the sheet between them and move it forward until its edge is gripped between the sheet-feeding rolls J, J', whereupon the sheet is released by the gripping-fingers and those fingers are returned to their original positions. The rolls J, J', being continuously rotated, forward the sheet between them, and the sheet is curled by the guide j^2, so that it moves out over the page-form of type and the printing ribbon overlying the same. When the rear edge of the sheet passes beyond the line of coaction of the rolls J, J', the sheet is in the proper position for printing. Further rotation of the shaft h^3 causes the cam h^2 to operate arm h' as above described, to lift the forward end of the feed-board H and all the parts carried thereby to the position in which it is shown in dotted lines in Fig. 1. As the feed-rolls J, J' and the guide j^2 are raised thus, the end of the sheet is released by the guide j^2 and the sheet straightens out so that it lies flat. The chains c^2, c^3, which have been moving during this time, then bring one of the pressure-rollers D, D', over the sheet, and the roller presses the sheet and the ink-ribbon underlying same down upon the printing faces of the type with sufficient pressure to effect the printing. The roller is moved thus over the entire page-form of type, and during its movement is held against the same in the relation which will give the desired pressure upon the printing faces of the type by the cams F, F'. After the roller passes beyond the type, the fingers G are brought by the chains c^2, c^3, to the position for coaction with the edge of the impression-sheet and these fingers forward the sheet before them until it falls into the delivery-tray g'. Immediately thereafter, the cam h^2 allows the feed-board H to rock again to the operative position and a new sheet is fed to the printing position so as to receive its impression as soon as the other pressure-roller comes around to a position over the type.

Referring to Figs. 4, 5 and 6, the machine illustrated in these figures is similar to that shown in Figs. 1, 2 and 3 in that the type b^3 are supported with their printing faces uppermost and two pressure rollers D, D' are employed carried by chains c^2, c^3 running on sprockets c', these pressure rollers being arranged to move over the type to effect the printing and then under the type to return to initial position; also cams F, F' are provided for coacting with the bearings c^4 of the pressure rollers to hold those rollers in the proper positions while effecting the printing and each roller carries a gear d^2 adapted to mesh with a rack d^3 so that the roller is positively rotated during the operation at the same surface speed as the speed at which it is moved over the type; also an ink ribbon E is employed overlying the printing faces of the type, the ends of this ribbon being carried by spools e, e' mounted at the sides of the machine. The mechanism for feeding the sheets into position for printing may be the same as that illustrated in Figs. 1, 2 and 3, including a pair of sectional sheet-feeding rollers J, J' and gripping fingers k, k', but this sheet-feeding mechanism is differently arranged. As shown in Fig. 4, the sheet-feeding mechanism is mounted upon the side frames A', A^2 at one end of the machine so that its forward edge overlies the operating shaft C. The feed-board H of this sheet-feeding device is stationarily mounted and its lower edge lies above the path of movement of the pressure rollers D, D'. The sheet-feeding rollers J, J' are continuously rotated during the operation of

the machine by gears m, m' connecting the roller J with a gear m^2 mounted on shaft C.

No means are illustrated for rocking levers L on the shaft l, but this rocking movement of the levers in order to actuate the gripping fingers may be effected in any suitable manner from the power shaft C. When the forward edge of the sheet is inserted between the sheet-feeding rollers J, J' by the gripping fingers k, k' the sheet is fed forwardly by those rollers and its forward edge drops down upon ink ribbon E overlying the printing faces of the type and moves over the same until arrested by a paper stop; as this occurs the rear edge of the sheet is released by the feed rollers J, J' and drops down upon the ink ribbon. The paper stop N is movably mounted and arranged to hold the sheet in position upon the type at the time when the pressure roller comes into contact with the sheet. Stop N preferably consists of a sheet metal strip pivotally mounted upon the edge of the support B for the type or the offsets b thereon, and a spring is arranged to act on plate N in a direction to hold the plate always in a vertical position. A stationarily mounted horizontally disposed strip n may also be secured upon the offsets b in such position that when the stop N is turned about its pivot to a horizontal position, the sheet whose edge has been carried into contact with the stop N will be gripped between the stop and strip n. This gripping of the sheet is effected as soon as one of the pressure-rollers D, D' comes around to the printing position. As the roller engages the stop N, it turns it about its pivot against the tension of its spring to the position in which the stop grips the edge of the sheet. Stop N thus holds the sheet in position until the pressure roller comes into coaction with the sheet and the printing operation starts, whereupon the stop is released by the pressure roller and is turned by its spring to the vertical position so that it will arrest the next sheet to be fed forward by the sheet-feeding device.

The sheets which have been printed upon may be removed by stripping fingers G mounted on the chains c^2, c^3 as above described in connection with Figs. 1 to 3. To guide the sheet as it is being moved thus, a strip g^2 may be mounted upon the type-support B at the end opposite that on which the paper stop N is mounted, this plate g^2 serving to support the printed sheet as it is being removed from the type so that the sheet will fall properly into the delivery-tray g'.

The operation of the machine above described is similar to that described in connection with Figs. 1 to 3; it will be noted, however, that the sheets are fed into and delivered from the machine at the same end thereof, that the feed-board and the sheet-feeding device mounted thereon are stationary instead of having a movement about a pivot, that the sheets are fed directly to the printing position instead of being guided over a curved path, that a stop is arranged to arrest the movement of the sheets when the latter have reached the proper position and that this stop grips the sheet holding it while the printing operation starts.

The machine illustrated in Figs. 7, 8 and 9 differs from those above described principally in that the type are arranged with their printing faces downward as this arrangement of the type offers the advantage that the opposite ends thereof may be provided with display faces so that the matter set up may be read and errors more readily detected. The chase b is provided with a plurality of channels into which the type b^5 may be dropped, these type being provided with shoulders to coact with the channel bars of the chase to limit the downward movement of the type. The members of the chase are provided with flanges which coact with bars b^4 extending between the side frames A', A^2 to support the chase. A pad b^5 of yielding material is laid over the upper ends of the type as shown, the upper surface of this pad being above the upper surfaces of the chase b and bars b^4. The platen B' is arranged beneath the type and is adapted to be moved vertically upward to operative position after a sheet has been fed between the platen and the ink ribbon E underlying the printing faces of the type. For this purpose the platen is carried by two pairs of arms O, each of which is bifurcated and the arms of the several pairs straddle shafts o, o' extending between the side-frames of the machine and mounted for rotation therein. On each of the arms O is a roller o^2 adapted to coact with a cam o^3 secured upon the shafts o, o'. The shafts o, o' are extended through their bearings on one side of the machine as shown in Fig. 8 and carry gears o^4, these gears being driven from a gear on the power shaft C'. This shaft and the shaft C carry sprockets on which two pairs of chains run, as above described, and these chains carry rollers D, D', the rollers in this case being pressure rollers only, instead of combined pressure and platen rollers as in the case of the machines above described. The bearings for rollers D, D', coact with cams F, F' so that the movement of the rollers while in coaction with the type is in a straight line, and each roller is preferably provided with a gear which, during the printing movement, meshes with a rack d^3 mounted on the side-frames A' A^2. The ink ribbon E extends beneath the type so that it directly underlies the printing faces thereof and the spools carrying the ends of this ribbon are mount-

ed at opposite ends of the page-form of type instead of at opposite sides.

The impression sheets are fed into the machine and delivered therefrom at one side of the machine instead of at the end. For feeding the sheets, a sheet-feeding device is employed which may be similar to that described above, consisting of continuously rotated sectional feed-rolls J, J′ and gripping fingers k, k' adapted to be reciprocated to insert the edge of a sheet between the sectional feed rolls. The gearing for continuously rotating the feed-rolls and the mechanism for reciprocating the grippers, are not illustrated in detail as any suitable connections may be employed for this purpose. The feed-board H is extended beyond the feed-rolls J, J′ and its forward edge lies close to the adjacent ends of the page-form of type and the platen B′. The feeding movement of the sheets is arrested when the sheets are in a proper position by stops P pivotally mounted upon links p, which are pivoted at their upper ends to one of the cross-bars b^6 for supporting the chase b. Each of the stops P is provided with a downwardly extending curved arm p' on the end of which is an offset coacting with a cam p^2 mounted upon one of the shafts a, a'. A spring p^3 is connected to each link p and acts thereon to turn the link in a direction to carry the stop P to the right in Fig. 8. A spring p^4 is connected to each stop P and acts thereon to turn the stop on its pivot in a direction to hold the end thereof in contact with the corresponding cam p^2. The cams p^2 are so shaped and positioned that the operative faces of the stops P are held in position to coact with the edge of an advancing impression sheet, to arrest the movement of the sheet when the latter is in the proper position for printing. When in this position, the stops P are free of the edge of the platen B′ and the platen may be raised vertically by the cams a^2 to raise the sheet until it directly underlies the ink ribbon E and the printing faces of the type. After the printing is effected, the platen B′ is again lowered by the cams a^3 and the cams p^2 then act on the stops P to move them to the left in Fig. 8, so that their operative faces move over the upper face of the platen B′ carrying the sheet which has been printed upon with them. When the sheet is moved thus, its opposite edge is carried between a pair of delivery rolls R which are rotated by suitable gearing at such speed that the sheet when grasped thereby is drawn quickly over the surface of platen B′ and discharged into the delivery tray g'.

The operation of the machine will be readily understood from the foregoing description. The sheets to be imprinted upon are fed over the surface of feed-board H at the proper intervals until the forward edge of each sheet passes between the grippers and is arrested by the stops of the sheet-feeding device. At the proper time with relation to the positions of the pressure rollers and the platen, the edge of the sheet is grasped between the grippers and forwarded thereby until it is gripped between the feed-rollers J, J′ whereupon the sheet is released by the grippers k, k' and its further movement is effected by the feed-rollers. When thus fed, the sheet passes between the platen B′ and the ink ribbon E underlying the printing faces of the type, the platen being then in the lower or inoperative position, and the movement of the sheet continues until it is arrested by the edge of the sheet engaging the stops P. Immediately thereafter the platen B′ is raised by the cams a^2 so that the sheet is carried upwardly, preferably to such extent that it comes into engagement with the ribbon E and the latter, together with the type b^3, loose in the channels of the chase, are raised a slight amount. While the platen is held in this position by the cams a^2, one of the pressure rollers D, D′ comes into printing position with its journals underlying the cams F, F′, and its gear d^2 meshing with the rack d^3. At this time the surface of the roller comes in contact with the yielding pad b^5 overlying the upper ends of the type and as the roller moves along the rows of type are pressed downwardly thereby so that their printing faces imprint upon the sheet supported by the platen. After the roller passes beyond the page-form of type the platen B′ is immediately lowered by the cams a^3, and the cams p^2 operate the stops P to push the sheet to the left in Fig. 8, so that its edge is grasped between the delivery rollers R and the sheet is fed out into the delivery tray g'.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:—

1. A printing machine having a bed for supporting a form of type with their printing faces in a plane, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, and a rotatable platen-roller having a continuous bodily movement during a portion of which it coacts with the type to imprint upon the sheets and during the remainder of which it returns to initial position, substantially as set forth.

2. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, and two rollers having continuous movement, said rollers coacting successively with the type to imprint upon the sheets

during a portion of their movement and returning to initial position during the remainder of their movement, substantially as set forth.

3. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, means for delivering the sheets after they have been imprinted upon, and a roller having a continuous movement during a portion of which it coacts with the type to imprint upon the sheets and during the remainder of which it returns to initial position, substantially as set forth.

4. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, a roller, means for moving said roller in one direction on one side of the type in coaction therewith to effect the printing and in the other direction on the other side of the type to return to initial position, sheet-feeding devices for feeding sheets successively to printing position, and means for operating said devices in accordance with the movement of said roller to feed a sheet to printing position while said roller is returning to initial position, substantially as set forth.

5. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, two rollers, and means for moving said rollers successively in one direction on one side of the type in coaction therewith to effect the printing and in the other direction on the other side of the type to return to initial position, substantially as set forth.

6. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, means for delivering the sheets after they have been imprinted upon, a roller, and means for moving said roller in one direction on one side of the type in coaction therewith to effect the printing and in the other direction on the other side of the type to return to initial position, substantially as set forth.

7. A printing machine having a support for a form of type, shafts mounted at opposite ends thereof, sprockets on said shafts, chains running on corresponding sprockets on the two shafts, two rollers mounted for rotation on said chains and adapted to be carried into coaction with said type successively to effect the printing, an ink-ribbon supported in coöperative relation to the printing faces of the type, and sheet-feeding devices for feeding sheets successively to printing position, substantially as set forth.

8. A printing machine having a support for a form of type, shafts mounted at opposite ends thereof, sprockets on said shafts, chains running on corresponding sprockets on the two shafts, two rollers rotatably mounted on said chains and adapted to be carried thereby successively into coaction with the type to effect the printing, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, and means for delivering the sheets after they have been imprinted upon, substantially as set forth.

9. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, sheet-feeding devices for feeding sheets successively to printing position, sheet-delivery devices, a roller, means for moving the same in one direction on one side of the form of type and in coaction with the printing faces thereof to effect the printing and in the opposite direction on the other side of the type, and means for holding the roller against movement away from the type while moving in coaction therewith, substantially as set forth.

10. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, two rollers, means for moving the same successively in one direction on one side of the form of type and in coaction with the printing faces thereof to effect the printing and in the opposite direction on the other side of the type, means for holding said rollers against movement away from the type while moving in coaction therewith, sheet-feeding devices for feeding sheets successively to printing position, and means for operating said devices in accordance with the movement of said rollers to feed a sheet to printing position while each of said rollers is returning to initial position, substantially as set forth.

11. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces thereof, sheet-feeding devices, shafts at opposite ends of said support, sprockets thereon, chains running on corresponding sprockets on the two shafts, two rollers mounted for rotation on said chains and adapted to be carried thereby successively into coaction with the printing faces of the type, and sheet-strippers mounted on said chains in rear of said rollers, substantially as set forth.

12. A printing machine having a support for a form of type, an ink-ribbon supported in coaction with the printing faces thereof, sheet-feeding devices for feeding sheets suc-

cessively, a stop for arresting the feed of the sheets when in printing position, a roller, and means for moving said roller in one direction on one side of the type and in coaction therewith to effect the printing and in the other direction on the other side of the type to return to initial position, substantially as set forth.

13. A printing machine having a support for a form of type, an ink-ribbon supported in coaction with the printing faces thereof, sheet-feeding devices for feeding sheets successively, means for arresting the feed of the sheets when in printing position and for gripping the sheets to hold them in printing position, a roller, and means for moving the same in one direction on one side of the type and in coaction therewith and in the other direction on the other side of the type, substantially as set forth.

14. A printing machine having a support for a form of type, an ink-ribbon supported in coaction with the printing faces thereof, sheet-feeding devices for feeding sheets successively, a stop for arresting the feed of the sheets when in printing position, said stop being movable to grip the sheet and hold it in position, a roller, and means for giving the same a continuous movement during a portion of which it coacts with the type to effect the printing and during the remainder of which it returns to initial position, substantially as set forth.

15. A printing machine having a support for a form of type, an ink-ribbon overlying the printing faces of the type, a sheet-feeding device above said support, means for operating the same successively to feed sheets down upon the ink-ribbon and type, a roller, and means for giving the same a continuous movement during a portion of which it coacts with the type to effect the printing and during the remainder of which it returns to initial position, substantially as set forth.

16. A printing machine having a support for a form of type, an ink-ribbon overlying the printing faces of the type, a sheet-feeding device above said support, means for operating the same successively to feed sheets down upon the ink-ribbon and type, two rollers, and means for moving the same successively in one direction over the type and in coaction with the printing faces thereof and in the other direction beneath the type to return to initial position, substantially as set forth.

17. A printing machine having a support for a form of type, an ink-ribbon overlying the printing faces of the type, a sheet-feeding device above said support, means for operating the same successively to feed sheets down upon the ink-ribbon and type, chains at opposite sides of the machine, a roller mounted for rotation thereon and adapted to be carried thereby over the type and in coaction with the printing faces thereof and then beneath the type, and adjustable cams for holding the roller in coaction with the printing faces of the type, substantially as set forth.

18. A printing machine having a support for a form of type, an ink-ribbon overlying the printing faces of the type, a roller, means for moving said roller in one direction in coöperation with the printing faces of the type to effect the printing and in the other direction beneath the type to return to initial position, a sheet-feeding device and delivery apparatus located at one end of the machine, means for operating said sheet-feeding device to feed sheets successively over the printing faces of the type and the ink-ribbon, and means for forwarding the sheets from the printing position to said delivery apparatus, substantially as set forth.

19. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, two rollers having a continuous movement during a portion of which they coact successively with the type to imprint upon the sheets and during the remainder of which they return to initial position, means for delivering the sheets after they have been imprinted upon, sheet-feeding devices for feeding sheets successively to printing position, and means for operating said sheet-feeding devices in accordance with the movement of said rollers to feed sheets to printing position, substantially as set forth.

20. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces of the type, a roller, means for moving the same in one direction on one side of the form of type and in coaction with the printing faces thereof to effect the printing and in the opposite direction on the other side of the type, means for holding the roller against movement away from the type while moving in coaction therewith, sheet-feeding devices for feeding sheets successively to printing position, and means for operating said devices in accordance with the movement of said roller to feed a sheet to printing position while the roller is returning to initial position, substantially as set forth.

21. A printing machine having a support for a form of type, an ink-ribbon supported in coöperative relation to the printing faces thereof, shafts at opposite ends of said support, sprockets thereon, chains running on corresponding sprockets on the two shafts, a roller mounted for rotation on said chains and adapted to be carried thereby into coaction with the printing faces of the type, sheet-strippers mounted on said chains in rear of said roller, sheet-feeding devices for feeding sheets to printing position, and

means for operating said devices in accordance with the movement of said roller to feed a sheet to printing position while the roller is returning to initial position, substantially as set forth.

22. A printing machine having a support for a form of type, an ink-ribbon supported in coaction with the printing faces thereof, a roller, means for moving the roller in one direction on one side of the type and in coaction therewith to effect the printing and in the other direction on the other side of the type to return to initial position, sheet-feeding devices for feeding sheets successively to printing position, means for operating said devices in accordance with the movement of said roller to feed a sheet to printing position, and a stop for arresting the movement of the sheets when the latter reach the printing position, substantially as set forth.

23. A printing machine having a support for a form of type, an ink-ribbon supported in coaction with the printing faces thereof, a roller, flexible carriers on which said roller is mounted, means for operating said carriers to move the roller in one direction on one side of the type and in coaction therewith and in the other direction on the other side of the type, sheet-delivery devices moving with said carriers, sheet-feeding devices for feeding sheets successively to printing position, means for operating the sheet-feeding devices in accordance with the movement of said roller, and a stop for arresting the sheets in the printing position, substantially as set forth.

This specification signed and witnessed this 9th day of March, 1908.

SAMUEL OWEN EDMONDS.

Witnesses:
D. S. EDMONDS,
J. MCINTOSH.