

H. J. SMITH & A. S. WOODWARD.
PRINTING MACHINE.

APPLICATION FILED AUG. 3, 1908.

928,887.

Patented July 20, 1909.

5 SHEETS—SHEET 1.

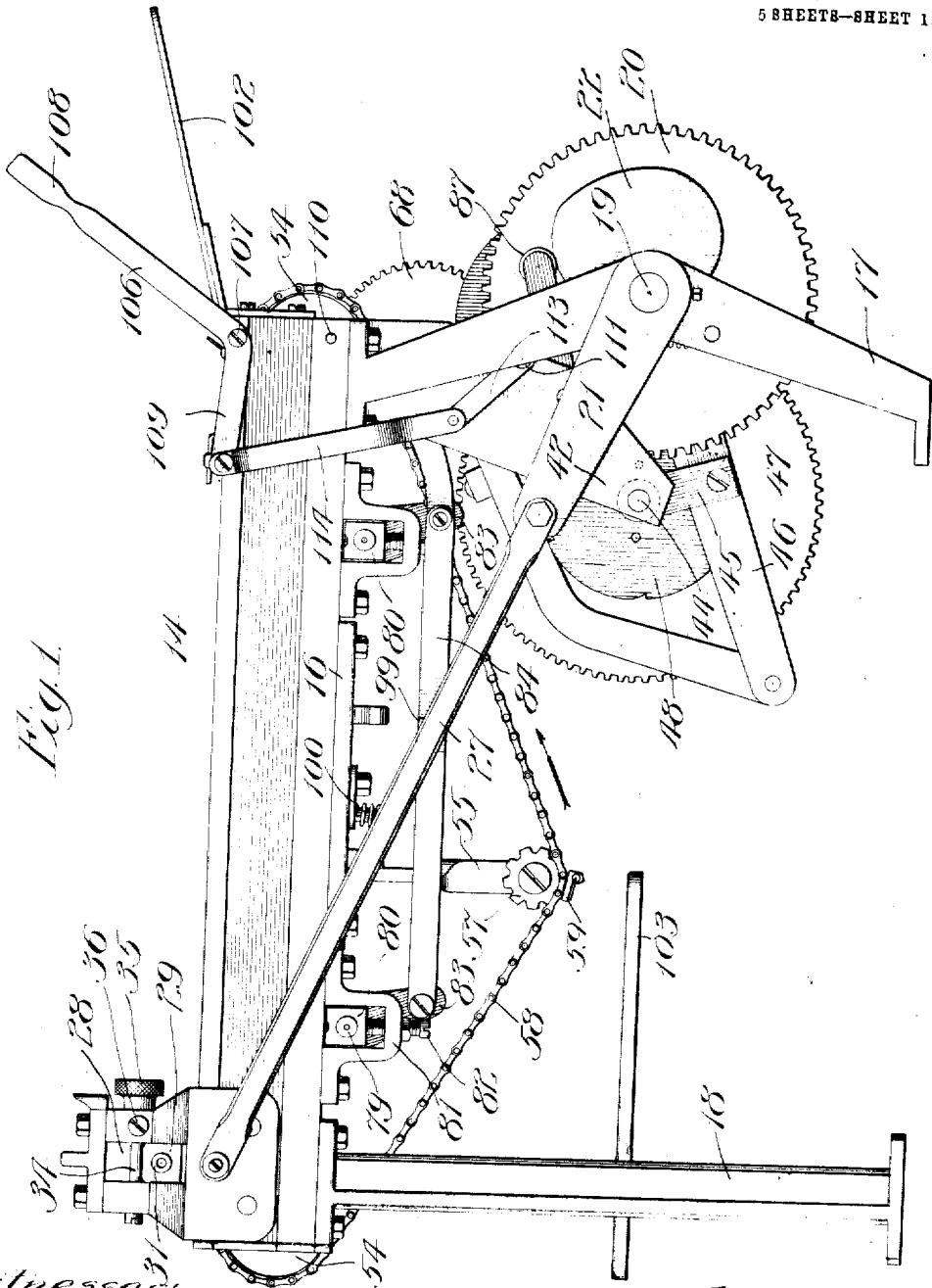


Fig. 1.

Witnesses:
John Enders
Chas. H. Bull

Inventors
Hazor J. Smith
Albert S. Woodward.
By *sydney h. lechman & co.*
Attys.

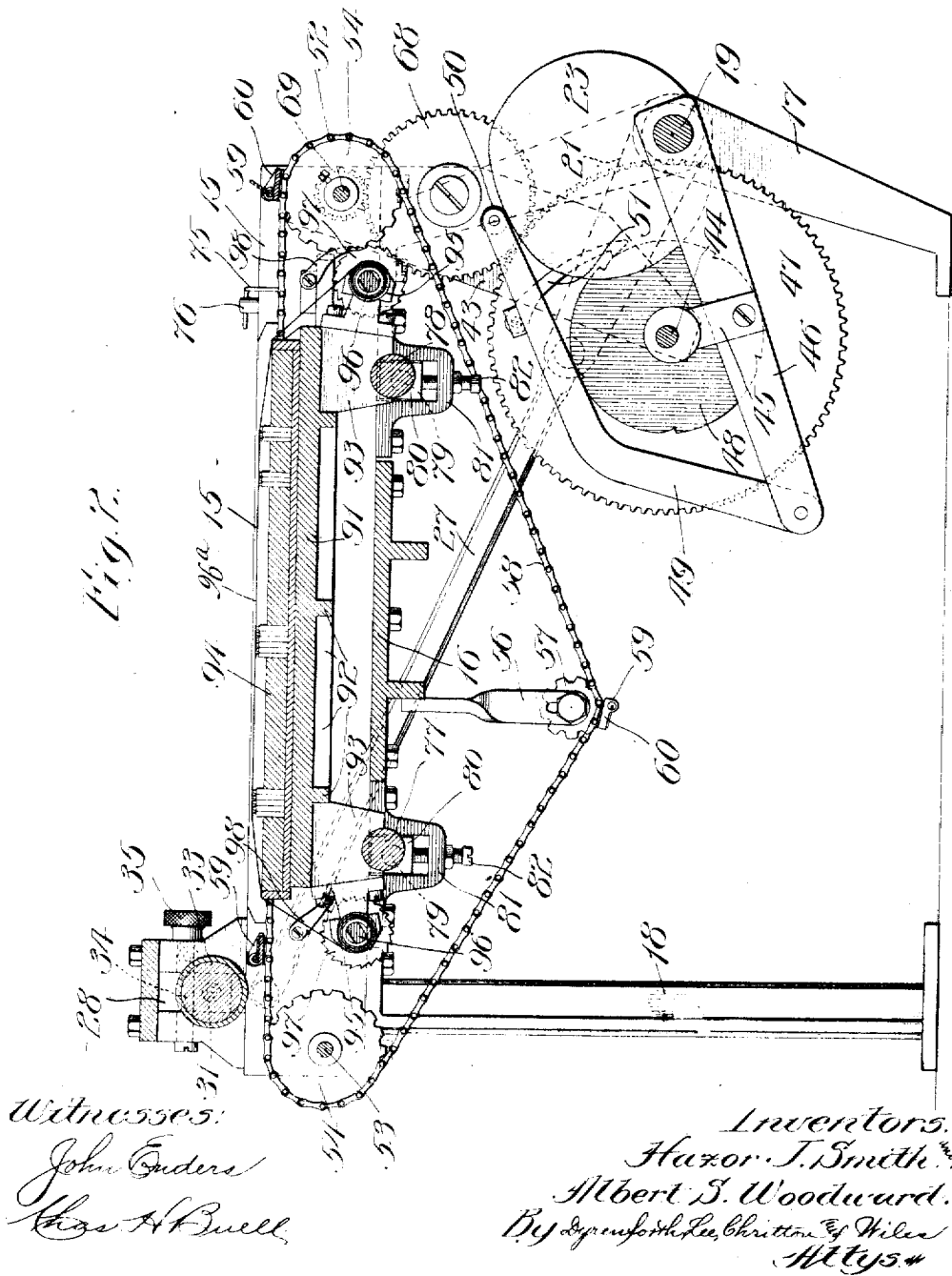
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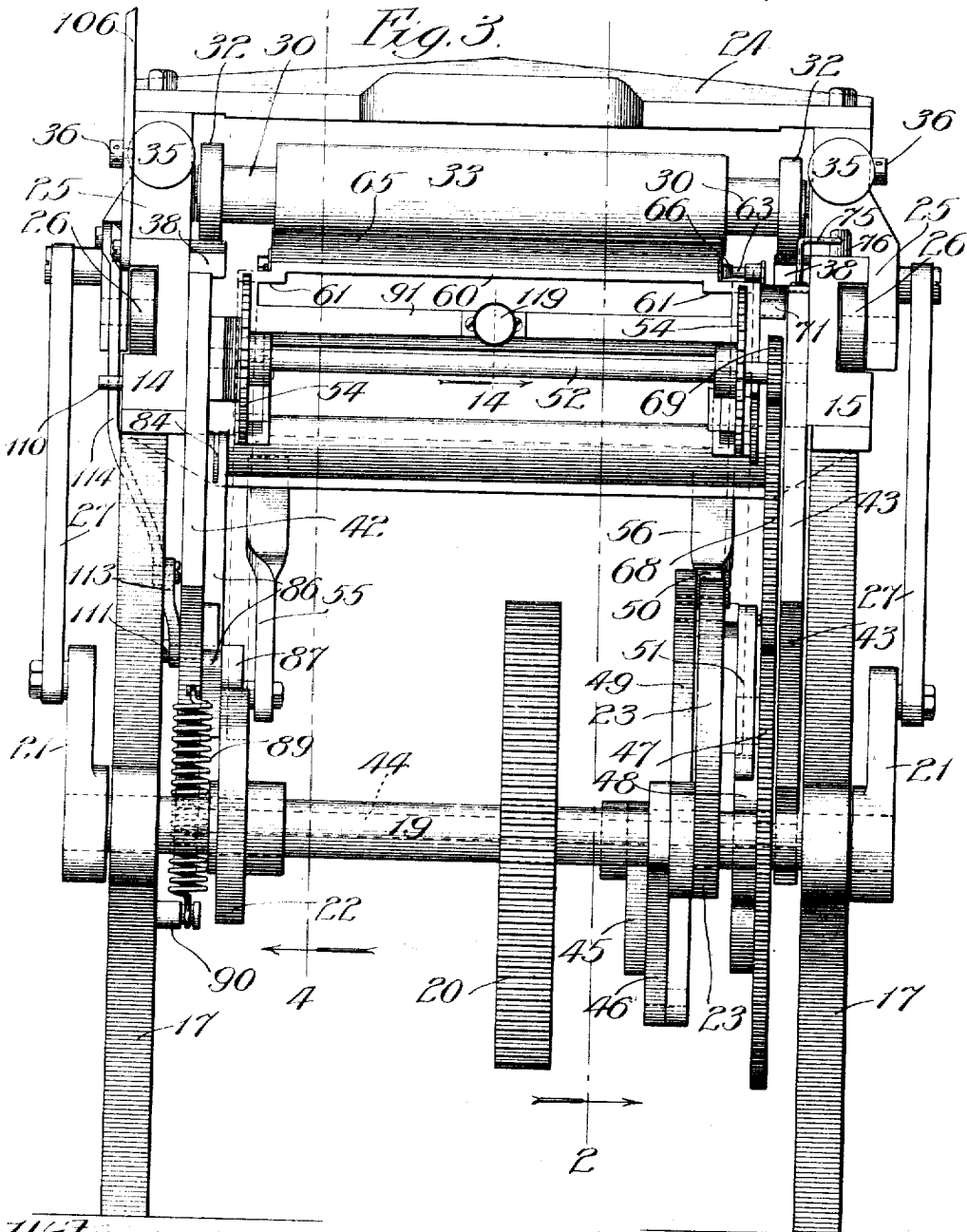
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Witnesses:

John Anders
Chas A. Bull

Inventor:

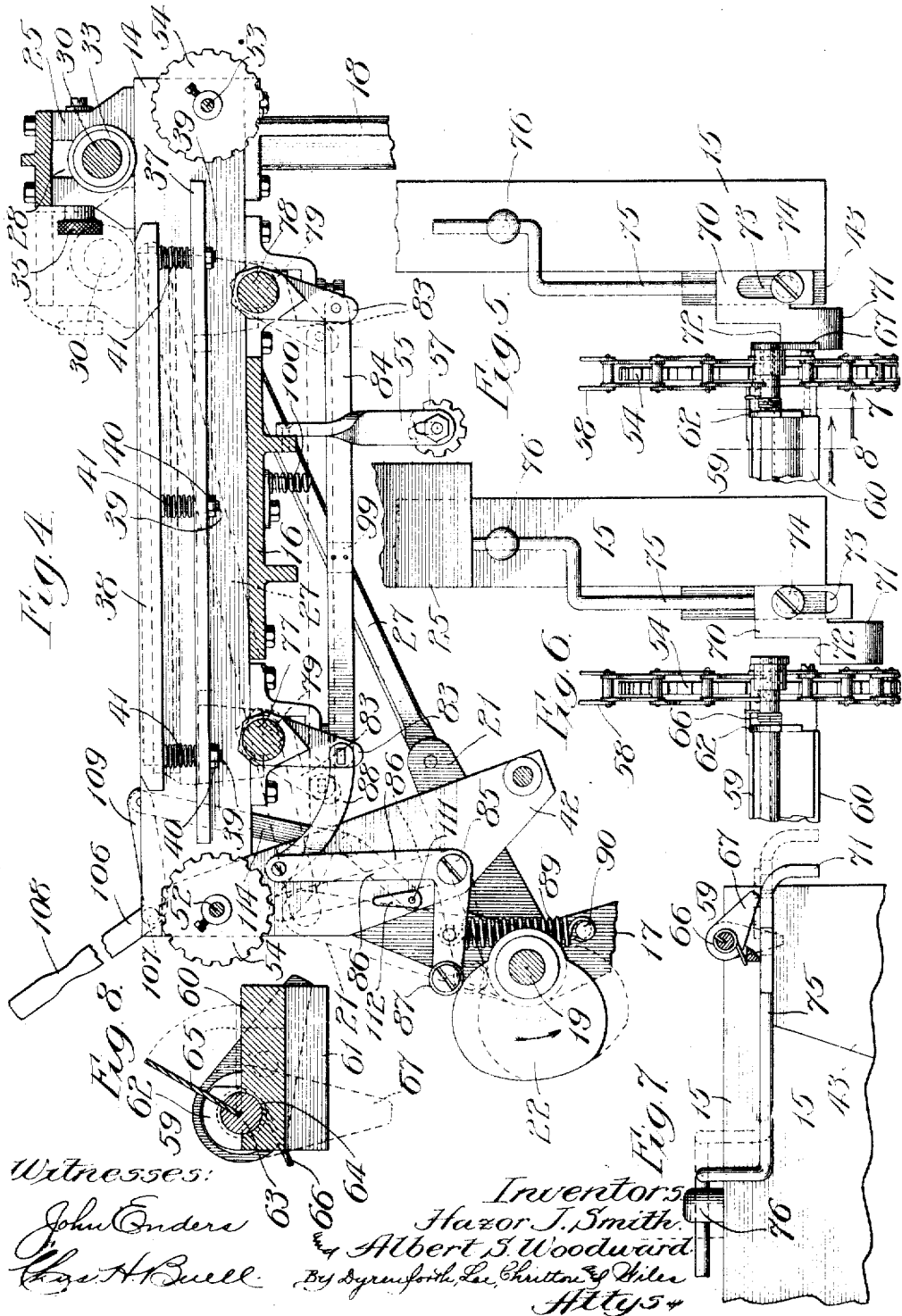
Hazor J. Smith &
Albert S. Woodward.
By dyer, fork, Le, Chittin & Wilson
Attys. #

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5 SHEETS—SHEET 4.



Witnesses:

John Enders
 Chas. H. Buell

Inventors

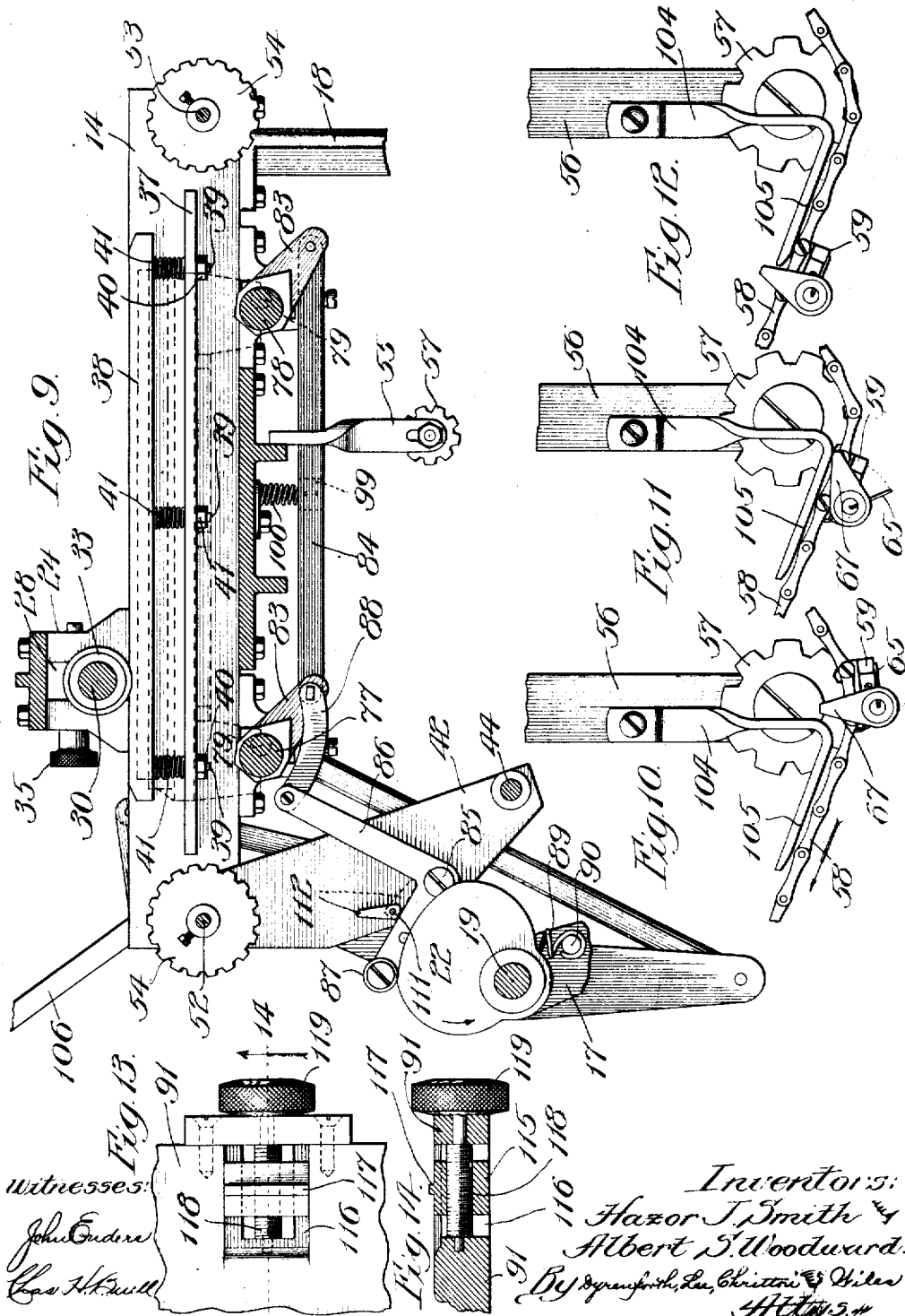
Hazor J. Smith
 Albert S. Woodward
 By *Dyranforth, Lee, Chittin & Wiles*
 Attys

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5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

HAZOR J. SMITH AND ALBERT S. WOODWARD, OF CHICAGO, ILLINOIS, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO AUTOMATIC LETTER MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PRINTING-MACHINE.

No. 928,887.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed August 3, 1908. Serial No. 446,680.

To all whom it may concern:

Be it known that we, HAZOR J. SMITH and ALBERT S. WOODWARD, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Printing-Machines, of which the following is a specification.

This invention relates to an improvement in printing machines more especially of the class in which the printing is performed by means of an inked or carbon-coated ribbon or sheet interposed between a bed of type, or the like, and the sheet to be printed, the impression being produced by a "platen" usually in the form of a rubber-coated roller moving across the rear face of said sheet. Machines of this class are designed for use in mercantile houses, offices, etc., for the production of form letters, circulars and the like, printed in imitation of typewritten work, or otherwise.

Our object is to provide a printing machine of this class of a particularly simple and generally improved construction adapting it for turning out printed sheets with great rapidity and with even impressions throughout without danger of the sheets being soiled by what is called "ribbon smear" in their passage through the machine.

In the accompanying drawings Figure 1 is a side elevation of a printing machine of the character described and of our improved construction; Fig. 2, a longitudinal section taken on line 2 in Fig. 3, but upon the same scale as Fig. 1; Fig. 3, an elevation on an enlarged scale of the front or feeding-end of the machine; Fig. 4, a broken section on the same scale as Fig. 1, the section being taken on line 4 in Fig. 3, showing the type-bed by dotted lines and showing by full lines certain moving parts in the relative positions they occupy just previous to the commencement of a printing operation, the relative positions of the same parts at the time of commencing a printing operation being indicated by dotted lines; Fig. 5, a broken, detail, top-plan of paper-gripping and feeding mechanism showing the position it occupies while at rest during a printing operation with its gripping jaws open ready to engage a sheet fed to it; Fig. 6, a view similar to Fig. 5 but showing the relative

positions of parts when the feed mechanism has gripped a sheet and is about to move backward to feed and position the sheet over the type-bed; Fig. 7, a section taken on line 7 in Fig. 5 and showing by full lines the relative positions of coöperating parts when the movable jaw of the paper-gripping and feed-mechanism is open to receive a sheet, and showing by dotted lines the position of the same parts when they have been moved to cause the gripping of a sheet; Fig. 8, an enlarged section taken on line 8 in Fig. 5, showing by full lines the position of parts when the movable gripping-jaw is open, and by dotted lines their position when said jaw is closed; Fig. 9, a section taken on the same line as Fig. 4, but showing the moving parts in the position they occupy at the time of the completion of a printing movement; Figs. 10, 11 and 12 enlarged broken side-elevations of one of three similar paper-gripping and feeding devices and the means for causing them to release and discharge the printed sheets, Fig. 10 showing the relative positions of parts before such release, Fig. 11 their positions during release, and Fig. 12 their positions after release; Fig. 13, an enlarged fragmentary plan-view of the type-bed, showing means for positioning the chase; and Fig. 14, a section taken on line 14 in Figs. 13 and 3.

The machine is formed with a suitable supporting frame consisting of parallel side-bars 14 and 15, having longitudinally-extending channels in their outer faces, and connected by a plate 16. The side-bars are supported at their forward ends on similarly-shaped legs 17 and at the rear ends upon the legs 18.

19 is a drive-shaft journaled in bearings in the legs 17, and, in the construction shown, it carries a gear-wheel 20 at which it may be geared to the armature shaft of an electric motor. It is to be understood, of course, that power may be applied in any other suitable way to drive the shaft. Beyond the legs 17 the drive-shaft carries cranks 21. Toward one side of the machine the shaft 19 carries an eccentric 22, of the shape shown, for example, in Fig. 9, and toward the opposite side of the frame it carries a larger eccentric 23 shaped as shown most clearly in Fig. 2.

The side-bars 14, 15 form tracks upon which is mounted a traveling-head or carriage 24 provided at opposite ends with depending portions 25 on which are journaled rollers 26 running in the channels or channel-guides formed in the outer faces of the side-bars. The traveling-head or carriage is connected at opposite ends with the cranks 21 by connecting rods 27, whereby in the rotation of the drive-shaft 19 it is reciprocated from the rear end of the frame, the position shown in Figs. 1 and 2, nearly to the forward end of the frame, the position indicated in Fig. 9. The cheeks or depending portions 25 of the traveling head are bifurcated in their upper parts to present guide-openings 28 which are fitted with journal-boxes 29.

30 is a shaft reduced at opposite end-portions to form journals 31 having their bearings in the boxes 29. Just within the cheeks of the traveling-head the shaft 30 carries rollers 32 and between the rollers 32, as shown most clearly in Fig. 3, it carries a roller 33 which may be faced or covered with rubber, as indicated in Fig. 2.

Extending across the openings 28 in the cheeks of the traveling head are eccentric shafts 34 provided at their ends with thumb-nuts 35 by means of which they may be rotated. At their eccentric portions the shafts 34 bear upon the tops of the boxes 29 and by turning the said shafts the said boxes and consequently the rollers 32, 33 may be adjusted to different elevations in the traveling head. The shafts 34 may be secured against turning by means of the set-screws 36.

On the inner faces of the side-bars 14, 15 are longitudinally-extending ribs 37. Just within the side-bars 14, 15 are bars or track-rails 38 provided each with three depending lugs 39 threaded along their lower end-portions. The lugs pass through openings in the ribs 37 and are provided at the under sides of the ribs with nuts 40. Surrounding the lugs and confined between the ribs 37 and track-rails 38 are springs 41. The springs operate as resilient supports for the track-rails and their tension may be adjusted by means of the nuts 40. The bars 38 form a resilient track for the rollers 32 to ride upon and are chamfered at opposite ends to permit the rollers to move on to them readily. The function of the resilient track will be explained later on.

Secured at their upper ends against the inner faces of the side-bars of the frame are depending-plates 42 and 43, in the lower ends of which is mounted a stationary cross-shaft 44. The shaft 44 carries a depending bracket 45 to which is fastened a stationary bar 46 which at its forward end is provided with an opening to surround the drive-shaft 19. The shaft 19 in this way is utilized as a support to aid in steadying and holding

rigid the bar 46. Journaled upon the shaft 44 are a gear-wheel 47 and a ratchet-wheel 48 integral with each other.

Fulcrumed at one end upon the end of the bar 46 is a swinging lever 49 provided at its free end with a roller 50 which rides upon the face of the eccentric 23. The lever 49 carries a pivotal pawl 51 engaging the ratchet-wheel 48. The lever 49 is swung upon its fulcrum by the rotation of the eccentric 23 and in its upward swing it engages a tooth of the ratchet-wheel 48 and turns the said wheel and the gear-wheel 47, in the present construction, exactly one-fifth of a revolution.

Journaled in opposite end-portions of the side-bars 14, 15 are shafts 52 and 53, each carrying a pair of sprocket-wheels 54 located near opposite ends of said shafts. Secured to and depending from the under side of the plate 16 near opposite ends of the same are hangers or brackets 55, 56 on which are journaled sprocket-idlers 57 in the vertical planes of the sprockets 54. Stretched around the sprocket-wheels and idlers is a pair of parallel tapes 58 in the form of chains or link-belts adapted to engage the teeth of the sprocket-wheels and idlers in a common manner. The tapes or chains 58 carry three similarly-constructed paper-feeding gripping-devices 59 spaced apart a distance equal to exactly one-third the length of the chains. Each gripping-device comprises a bar 60 provided at opposite ends with downward-projecting lugs 61, as shown most plainly in Figs. 3 and 8, at which they are fastened to the chains 58. Near their opposite ends the bars 60 carry bearing-ears 62 in which are journaled the opposite end-portions of shafts 63 which rock in longitudinal recesses 64 formed in the faces of the bars 60. Each shaft 63 carries a swinging plate 65, and said plates and companion bars 60 forming between them, in each instance, a paper-grip. Coiled about each shaft 63 at the end thereof nearest the side-bar 15 is a spring 66 fastened at one end to the shaft and its opposite end to the bar, the spring operating normally to press the plate 65 downward against the bar 60, thus closing the paper-gripping jaws. Fastened to the end of each shaft 63 is a laterally-extending finger 67.

Journaled upon the depending-plate 43 is an idle gear-wheel 68 in mesh with the gear-wheel 47; and the shaft 52 carries a pinion 69 which is engaged by the gear-wheel 68. 70 is a cam-shoe and latch comprising a plate having a downwardly-curved end-portion 71, cut-away portion presenting the edge 72 and elongated opening 73. The cam-shoe fits slidably upon the upper end of the plate 43, being held in place by a screw 74 passing through the elongated opening 73. Extending from one end of the

cam-shoe 70 is a bent rod 75 which near its free end slides through a perforated guide-projection 76 on the bar 15. The curved or cam-portion 71 of the part 70 is in the path of the fingers 67 of the paper-gripping feed-devices and the free end of the rod 75 when in the backward position illustrated in Fig. 5 is in the path of movement of a cheek 25 of the traveling-head 24, which in its final movement toward the front end of the machine, by engaging the end of the rod 75, moves the cam-shoe and latch device described to the position shown in Fig. 6. In the movement of a paper-gripping feed-device to the position shown in Fig. 5 the engagement of its finger 67 with the curved end of the cam-shoe forces the latter to the position shown in Fig. 5. When the cam-shoe has stopped in this position the final movement of the gripping-device to the position shown in Fig. 5 turns the finger and shaft 63 to the position indicated most plainly by full lines in Fig. 8, opening the grip for the reception of a sheet of paper to be fed into the machine. The gripping-device remains at rest during the movement of the traveling-head to the forward end of the machine, as will be more fully explained farther on, and in its final movement in that direction the head engages the end of the rod 75 and moves the cam-shoe and latch mechanism 70 to the position shown in Fig. 6, whereby the edge 72 is moved past the finger 67 to release it and permit the swinging jaw of the grip-device to be closed by the spring 66.

77 and 78 are parallel transverse cam-shafts journaled eccentrically at their reduced end-projections 79 in adjustable journal-boxes 80. The journal-boxes are in hangers 81 fastened against the under faces of the side-bars 14, 15 and the boxes 80 are adjusted to raise and lower them in the hangers by means of the set-screws 82. Rigidly secured to the shafts 77, 78, which are rocking cam-shafts, are depending fingers 83 connected together by a rod 84 which is below and parallel with the side-bar 14.

Fulcrumed at 85 against the inner face of the depending-plate 42 is a bell-crank lever 86 carrying at the end of its shorter arm a roller 87 which rides upon the face of the eccentric 22, as shown plainly in Fig. 4. The longer arm of the bell-crank lever 86 is pivotally connected with the adjacent finger 83, and end of the rod 84, by means of a link 88. A coiled spring 89 connected at one end to the shorter arm of the bell-crank lever and at its opposite end to a lug 90 on the adjacent leg 17 tends normally to maintain the roller 87 in contact with the face of the eccentric 22.

91 is a type-bed or frame consisting of a plate reinforced on its under side with flanges and ribs 92 and provided at its four

corners with depending lugs or legs 93 having concave lower ends to fit closely over the cam-shafts 77, 78 by which the type-bed is alone supported. The bed 91 is adapted to receive and position a printer's chase 94 in which may be locked the type, or other form to be printed, in a common manner. The cam-shafts 77, 78 maintain the type-bed parallel with the plane of the path of the impression-roller 33. Extending from opposite ends of the type-bed frame 91 at the legs 93 (see Fig. 2) are lugs 95 forming bearings for the opposite ends of ribbon-shafts 96. On each of the shafts 96, adjacent to the side-bar 15, is a ratchet wheel 97, and pivotally connected to the said side-bar adjacent to the said ratchet-wheels are pawls 98. It is to be understood that when a chase containing the form to be printed is placed upon the type-bed 91 an inked ribbon 96*, of a width equal, at least, to the width of the form to be printed and attached at its opposite ends to the respective shafts 96, is stretched over the form to rest upon the type, or the like.

In each rotation of the shaft 19, and consequently of the eccentric 22, the bell-crank lever 86 is rocked on the fulcrum 85. Owing to its link-connection 88 with the bar 84 and fingers 83 it rocks the cam-shafts 77, 78 simultaneously and raises and lowers the type-bed. On the bar 84, as indicated most clearly in Fig. 4, is a buffer-block 99, and on the under side of the plate 16 at the side-bar 14 is a buffer-spring 100, against which the buffer-block 99 impacts when the type-bed is raised.

The operation of the machine thus far described is as follows: The drive-shaft is rotated continuously by power applied to the driving gear-wheel 20. The traveling-head 24 carrying the impression-roller 33 is reciprocated by the cranks 21 at the desired speed back and forth between the position indicated, for example, in Fig. 1 and that indicated in Fig. 9. The impression-roller is thus moved back and forth over the type-bed, the printing in each instance being performed in the movement of the traveling-head toward the feeding-end of the machine. The eccentric 22 which operates to shift the type-bed as described is so constructed and arranged that in the final movement of the traveling-head to, and in its initial movement from, the position shown in Fig. 9 the bell-crank lever 86 is swung by the eccentric 22 to turn the cam-shafts 77, 78 and cause the type-bed to descend quickly to a position well below its printing-plane, maintaining it in that position during the backward travel of the said head. While the head is moving back and forth between the positions indicated by dotted and full lines in Fig. 1 the eccentric 22 permits the spring 89 to swing the bell-crank lever and turn the

cam-shafts to raise the type-bed quickly to the printing-plane, holding it in that position during very nearly the entire forward travel of the said head. The descent of the type-bed, brought about by the pressure of the eccentric 22 against the roller 87, is against the resistance of the spring 89 which tends to prevent undue vibration of parts in such descent when the machine is run at high speed. On the other hand, the contact of the buffer-block 99 with the spring 100, in the final rise of the type-bed brought about by the spring 89, prevents appreciable jar when the type-bed reaches its printing-plane. The pawls and ratchets 97, 98 are so arranged that in the rise of the type-bed one of the ribbon-shafts 96 is turned to feed the ribbon a short distance from one shaft 96 in the direction of the other. One pawl 98 is thrown into operation at a time to accomplish this result, the other pawl in the meantime being out of operation. When it is desired to reverse the feed of the ribbon the other pawl is caused to operate. In each rotation of the eccentric 23 the lever 49 is swung up and down as before described. The distance of movement given to the pawl 51 in each instance is but slightly in excess of the distance between the teeth of the ratchet-wheel 48, which are five in number. Therefore, during approximately one-half of a revolution of the shaft 19, while the traveling-head is being moved in the direction away from the feeding end of the machine, the pawl 51 engages the ratchet-wheel 48 and turns it exactly one-fifth of a revolution. During the other half of the revolution of the drive-shaft 19 the lever 49 swings down to the next tooth of the ratchet and the latter remains at rest. The train of gears 47, 68, 69 between the ratchet 48 and shaft 52 is so constructed and arranged that with each one-fifth rotation of the ratchet-wheel the tapes or chains 58 are caused to travel in the direction indicated by the arrow in Fig. 1 exactly one-third their length; and there being three paper feeding and gripping devices equidistant apart carried by the chains, at the end of each movement of the chains one gripping-device 59 will be left in position at the forward end of the machine, as indicated in Figs. 2, 5 and 8. The gripping-device in advance of the one mentioned will be just beyond the opposite end of the type-bed and the third gripping-device will be adjacent to the sprocket-idlers 57, as indicated in Figs. 2 and 10.

While a printing operation is being performed, by the forward travel of the impression-roller, the gripping-device at the forward end of the machine remains open, as indicated, and the operator slides a sheet of paper to be printed from the feed-table 102 into the open jaws. As the traveling-head 65 nears the forward end of the machine it en-

gages and thrusts the rod 75, as before described, moving the cam-shoe and latch device from the position shown in Fig. 5 to that shown in Fig. 6, thereby releasing the finger 67 of the gripping-device and causing the latter to close and grip the sheet of paper at its edge. In the following backward travel of the impression-roller and feed-chains the sheet thus gripped is drawn over the type-bed to the position in which it is to be printed. While a sheet is thus being fed into the machine the type-bed and attendant parts, including the inked ribbon, are in their lowered position and the sheet of paper as it is drawn into the machine from one edge and in a plane materially higher than the inked ribbon will not contact with the latter in a manner to become smeared thereby. In the next forward movement of the traveling-head and while the feed-chains and sheet of paper are at rest the sheet, while gripped at its edge, is pressed by the impression-roller against the inked ribbon which in turn is pressed against the type, or the like, of the printing-form. The roller, as before explained, runs upon a resilient track and the pressure exerted in making the impression is governed by the adjustment of the roller in the traveling-head. The resilient track yields only under comparatively great strain and operates by its sustaining force to prevent any change of pressure of the roller against the paper when crossing a wide space in the printing-form or passing over a short line of type. Without the resilient track the tendency of the impression-roller would be to cause a short line of type in the form to print more heavily upon the paper than would a long line of type, and the function of the resilient track, therefore, is to equalize the impression throughout the sheet. It also causes the roller to commence turning before reaching the type. When a sheet has been engaged by the sheet-gripping device, then in the sheet-receiving position, the device, during the next backward movement of the impression-roller, is moved to the position wherein it holds the sheet while the same is being printed. In the next following backward movement of the impression-roller the device is moved to its sheet-discharging position. Thus when a sheet has been printed it is advanced by the respective gripping-device until the latter stops at its sheet-discharging position, adjacent to the idlers 57, as indicated in Fig. 10. The gripping-device remains closed and quiescent in this position during a half revolution of the drive-shaft, while the next printing operation is being performed, and in this period the rear end of the sheet has time to sink down upon the receiving platform, or the like, 103, indicated in Fig. 1.

On the hanger 56 is a stationary bent plate

or strip 104 presenting a cam-face 105 in the path of the fingers 67. In the initial movement of a gripping-device from the position indicated in Fig. 10, the finger 67 contacts with the plate 104 and is swung to ride upon the face 105 and open the swinging jaw of the gripping-device. This opening of the jaw releases the sheet of paper and permits it to drop freely upon the receiving-table 103. When the gripping-device has passed the end of the face 105 the spring 66 closes the jaw again, as indicated in Fig. 12.

To prevent it smearing the sheet at any time it is necessary that the impression-roller shall never contact with the inked ribbon. As a means for preventing such contact when sheets of paper are not being fed into the machine we provide the mechanism shown most plainly in Figs. 1 and 9. A bell-crank lever 106 fulcrumed against the side-bar 14, at 107, has its long arm shaped to form a handle 108. Its short arm 109 may be moved to a projecting stop 110 on the side-bar 14. Extending through the adjacent depending-plate 42 and fulcrumed therein is a short rock-shaft 111 carrying on the inner face of said plate a swinging finger or stop 112 in the vertical plane of the long arm of the bell-crank lever 86. On the outer side of the plate 42 the rock-shaft 111 is provided with a crank-arm 113 connected by means of a link 114 with the short arm 109 of the lever 106. Normally the lever 106, swinging-stop 112 and attendant parts are in the positions indicated. By swinging the lever to the position indicated by dotted lines in Fig. 9 against the lever 86 to hold it in the position of maintaining the type-bed in its lowered position. The engagement of the stop or finger 112 with the lever 86 holds the roller 87 out of engagement with the eccentric. When the type-bed is in lowered position the inked ribbon lies well below the printing-plane, consequently backward and forward movement of the traveling-head will not cause the impression-roller to contact with the inked ribbon.

In the construction shown and described the feed of the sheets and their position during the printing operation are never varied. This makes it desirable therefore to have means for adjusting the chase longitudinally of the type-bed to position it properly with reference to the sheets. For this purpose we provide a block 115, mounted to slide in a recess 116 in the forward end of the type-bed 91. The block carries a chase-engaging projection 117 and may be moved longitudinally of the bed, a distance sufficient to properly position the chase, by means of an adjusting screw 118 provided with a thumb-piece 119.

In the use of our machine a sheet may be

printed with every revolution of the drive-shaft and the speed of operation is only limited by the speed of the said shaft. Owing to the buffer-block 99 and buffer-spring 100 no jar upon the parts occurs in the sudden rise of the type-bed to the printing-plane and the machine operates smoothly and comparatively noiselessly. Ample time is given for the proper feed of sheets to the gripping-devices and ample time is given for the proper discharge of sheets from the machine, all as explained.

Locating the drive-shaft 19 and cranks 21 below the plane of the path of the head or carriage, as shown, not only shortens the machine and renders it more compact, but contributes other advantages by causing the impression-roller to travel materially faster in the backward direction than in the forward or printing direction. As the speed at which the impression roller may travel in the forward direction, and turn out perfect work, is limited, which does not apply to the backward movement of the roller, the speed of operation of the machine is materially increased and its capacity proportionately augmented by thus locating the center of rotation of the cranks away from the plane of travel of the roller. It also allows more time between printing movements of the impression-roller for feeding sheets to the machine.

While we prefer to construct our improvements throughout as shown and described they may, obviously, be modified as to detail of construction without departing from the spirit of our invention as defined by the claims.

What we claim as new and desire to secure by Letters Patent is—

1. In a printing-machine, the combination with a type-bed, of an impression-roller, means for reciprocating the impression-roller across the type-bed, parallel endless sheet-feeding and discharging tapes, a sheet-gripping device on the tapes, and intermittently actuated driving means for the tapes operatively timed to move said gripping device across the type-bed between the printing movements of said roller.

2. In a printing-machine, the combination with a type-bed, of an impression-roller, means for reciprocating said roller across the type-bed, means for causing pressure against the type-bed of the roller in its printing movement and means for preventing contact with the type-bed of the roller in its reverse movement, parallel endless sheet-feeding and discharging tapes, a sheet-gripping device on the tapes, and intermittently actuated driving means for the tapes operatively timed to move said gripping-device across the type-bed between the printing movements of said roller.

3. In a printing-machine, the combination

with a type-bed, of an impression-roller, means for reciprocating said roller across the type-bed, parallel endless sheet-feeding and discharging tapes, a sheet-gripping device on the tapes, and cam-actuated intermittent driving means for the tapes operatively timed to move said gripping-device across the type-bed between the printing movements of said roller.

4. In a printing-machine, the combination with the drive-shaft and type-bed, of an impression-roller actuated from the drive-shaft to reciprocate across the type-bed, parallel endless sheet-feeding and discharging tapes, a sheet-gripping device on the tapes, a driving gear for the tapes, and means for advancing the tapes intermittently comprising a rotary cam actuated by the drive-shaft, a swinging lever actuated by said cam, a ratchet-wheel operatively connected with said gear, and a pawl on said lever engaging said ratchet-wheel.

5. In a printing-machine, the combination of a type-bed, a reciprocating impression-roller, type-bed shifting means operatively timed to move the type-bed and position it in its printing plane during the printing movement of said roller and to retract the type-bed and position it away from said printing plane during the movement of said roller in the reverse direction, parallel endless sheet-feeding and discharging tapes, a sheet-gripping device on the tapes, and intermittently actuated driving means for the tapes operatively timed to move said gripping-device across the type-bed while said bed is in its retracted position and to hold said gripping-device against movement while said bed is in its printing position.

6. In a printing-machine, the combination with a type-bed, of an impression-roller, means for reciprocating the impression-roller across the type-bed, parallel endless sheet-feeding tapes, a normally closed sheet-gripping device on the tapes, means for holding said device open in its sheet-receiving position, and intermittently actuated driving means for the tapes operatively timed to move said device across the type-bed between printing movements of said roller.

7. In a printing-machine, the combination with a type-bed, of an impression-roller, means for reciprocating the impression-roller across the type-bed, parallel endless

sheet-feeding and discharging tapes, a normally closed sheet-gripping device on the tapes, means for holding said device open in its sheet-receiving position, intermittently actuated driving means for the tapes operatively timed to move said device across the type-bed between printing movements of said roller, and means for opening said device as it passes its sheet discharging position.

8. In a printing-machine, the combination with the type-bed, reciprocating-head and impression-roller journaled in the head, of parallel endless feed-tapes, means operating to advance said tapes during the movement of said roller in one direction, means for holding said devices open in their sheet-receiving position and means for causing closure of said devices, before they leave said position, actuated by said head in its final movement in the opposite direction.

9. In a printing-machine, the combination with the type-bed and reciprocating impression-roller, of parallel endless tapes, normally-closed sheet-gripping devices on said tapes, means operating to advance said tapes during the movement of said roller in one direction, a movable catch, in the path of movement of said gripping-devices to their sheet-receiving position, operating to engage and hold said gripping-devices open in said position, and means operating to move said catch and cause closure of said gripping-devices before they leave said position.

10. In a printing-machine, the combination with the type-bed and reciprocating impression-roller, of parallel endless feed-tapes, normally-closed sheet-gripping devices on said tapes, means operating to advance said tapes during the movement of said roller in one direction, a catch in the path of movement of said gripping-devices to their sheet-receiving position, movable, by engagement therewith of said devices, to a position wherein it holds said devices open in their sheet-receiving position, and means operating to move said catch and cause closure of said gripping-devices before they leave said position.

HAZOR J. SMITH.
ALBERT S. WOODWARD.

In presence of:—

L. G. KIRKLAND,
J. G. ANDERSON.