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No. 548,357. Patented Oct. 22, 1895.

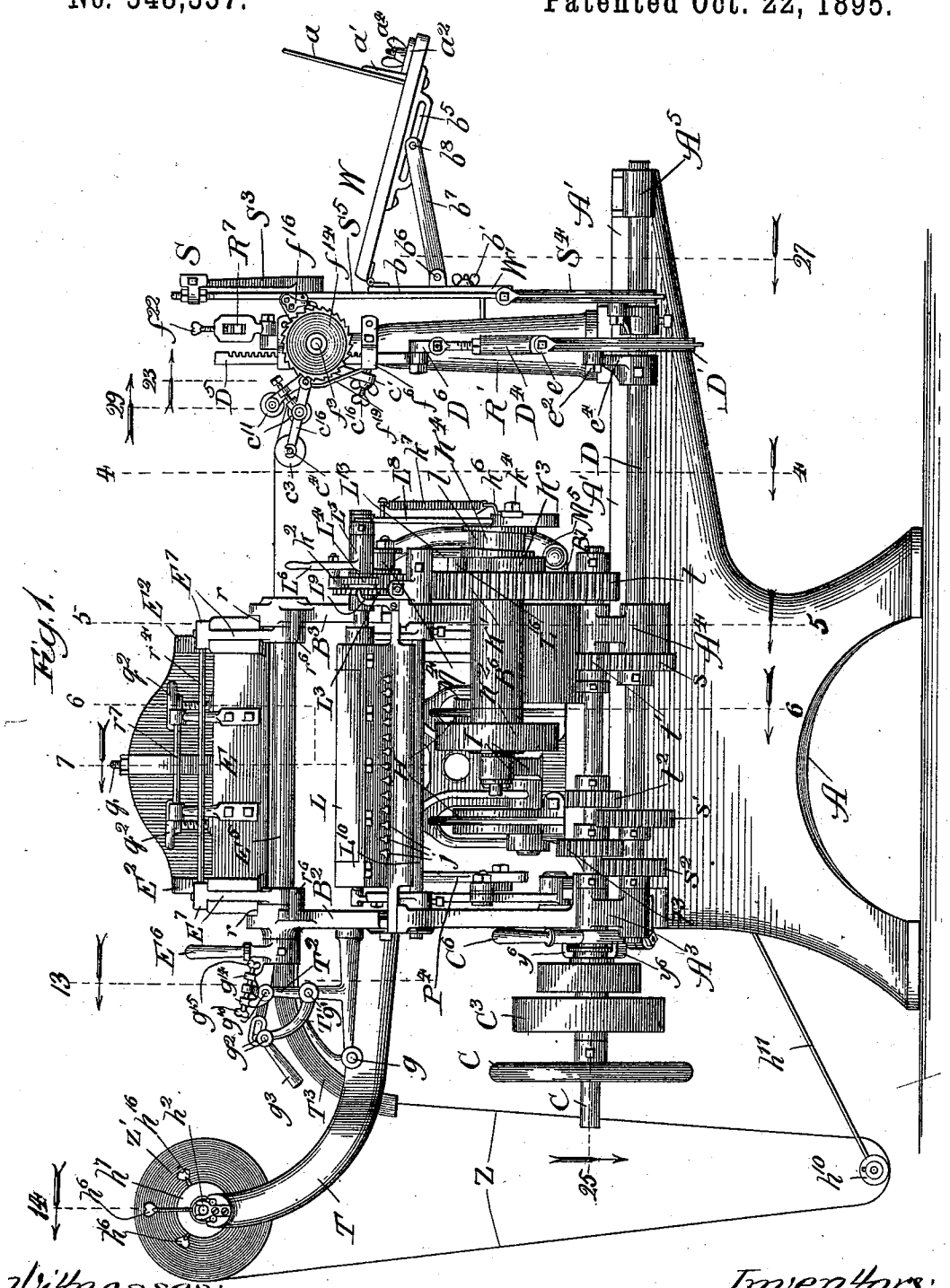

Fig. 1.

Witnesses:
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Lulu D. Alter.

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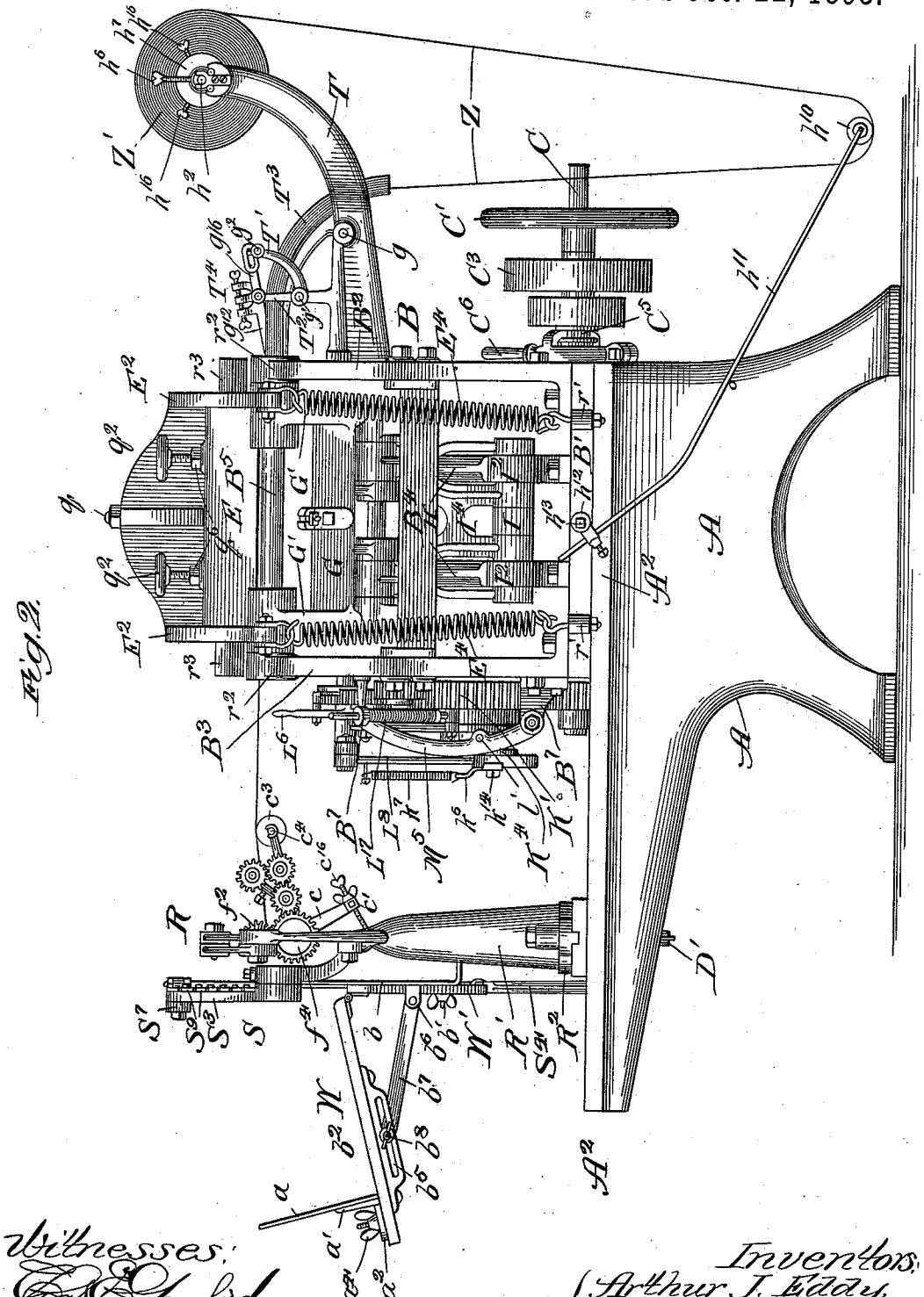

Fig. 2.

Witnesses:
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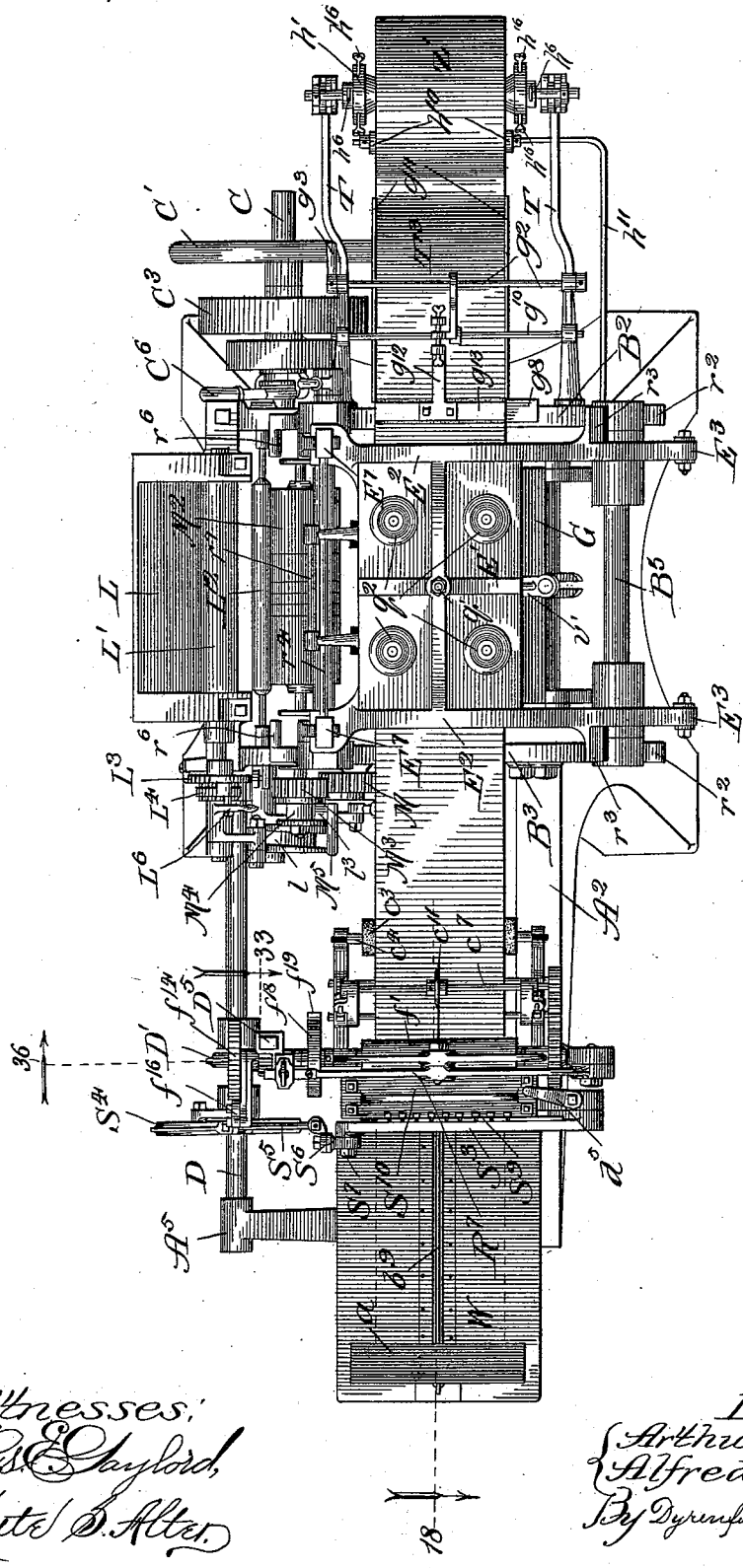

Fig. 3.

Witnesses:
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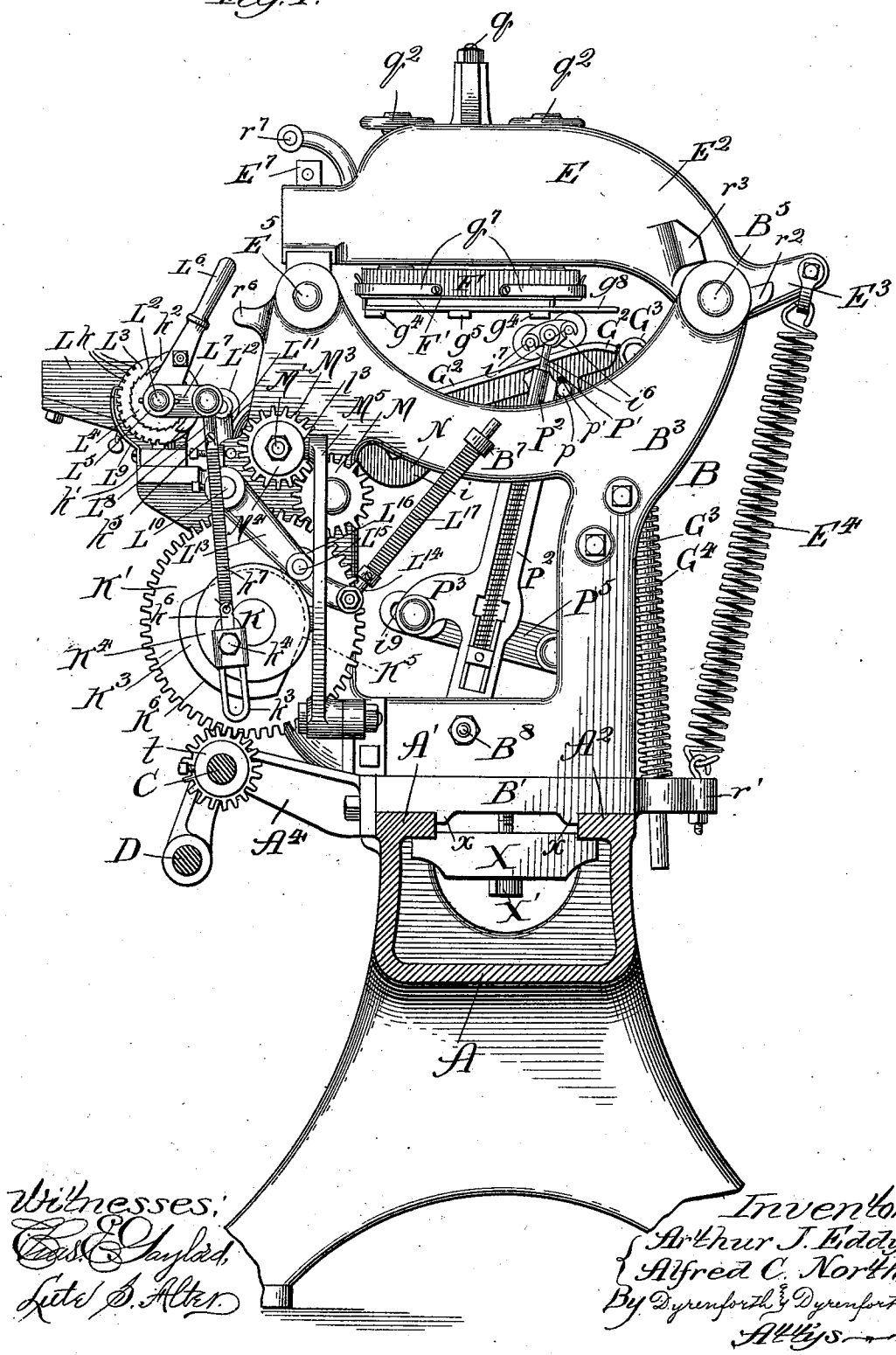
Fig. 4.



Witnesses:
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Fig. 5.

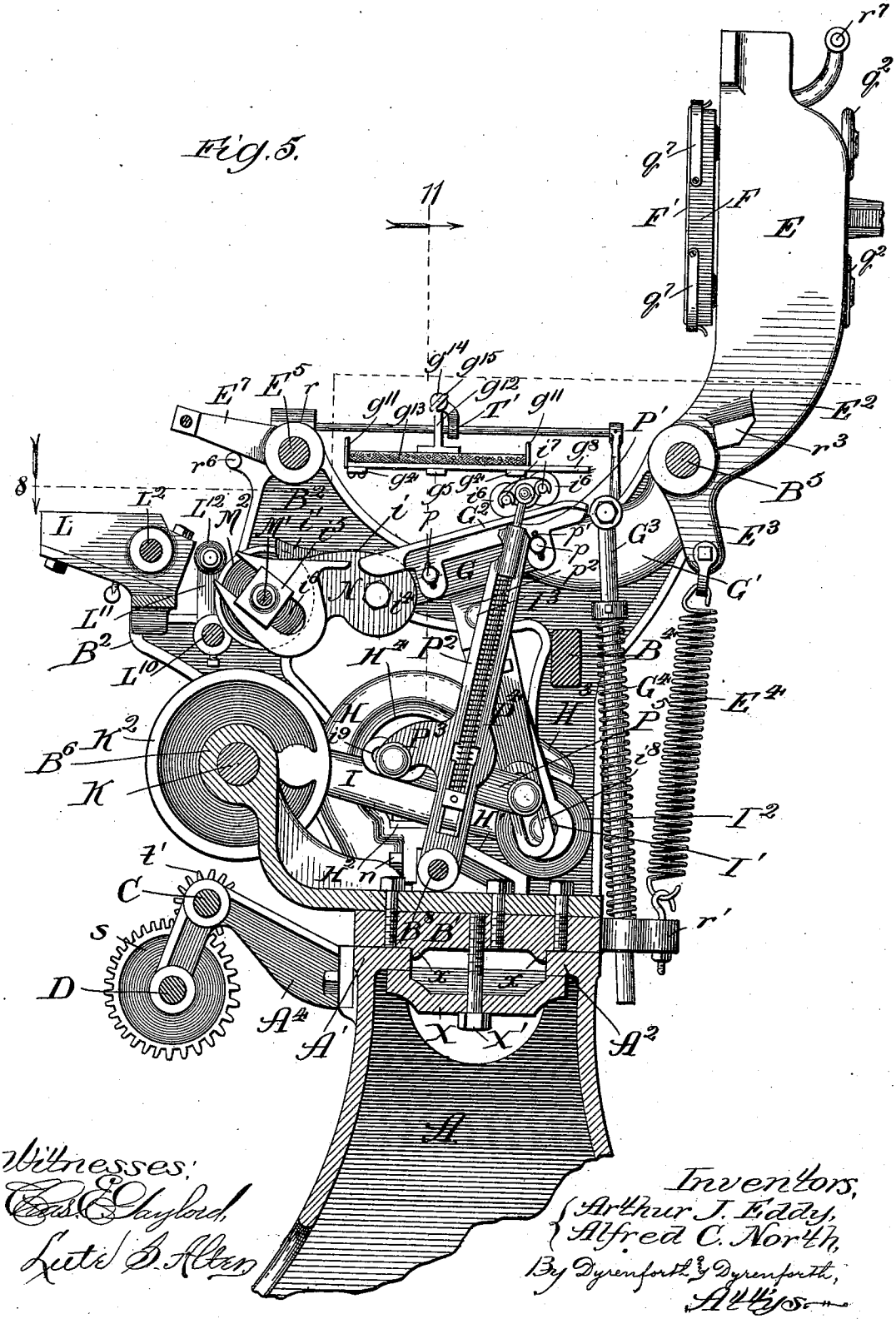

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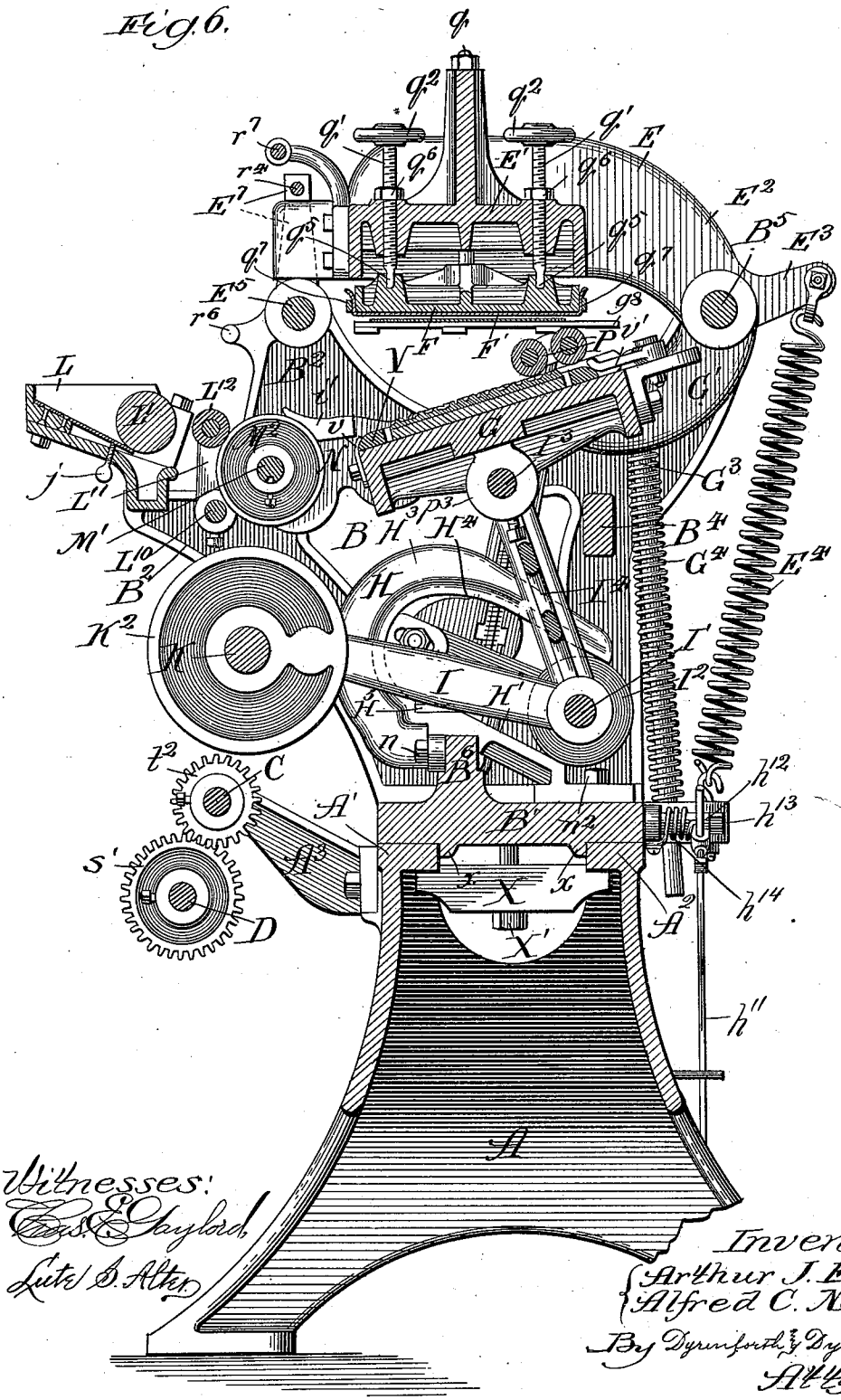
Fig. 6.



Witnesses:
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Alfred C. North.
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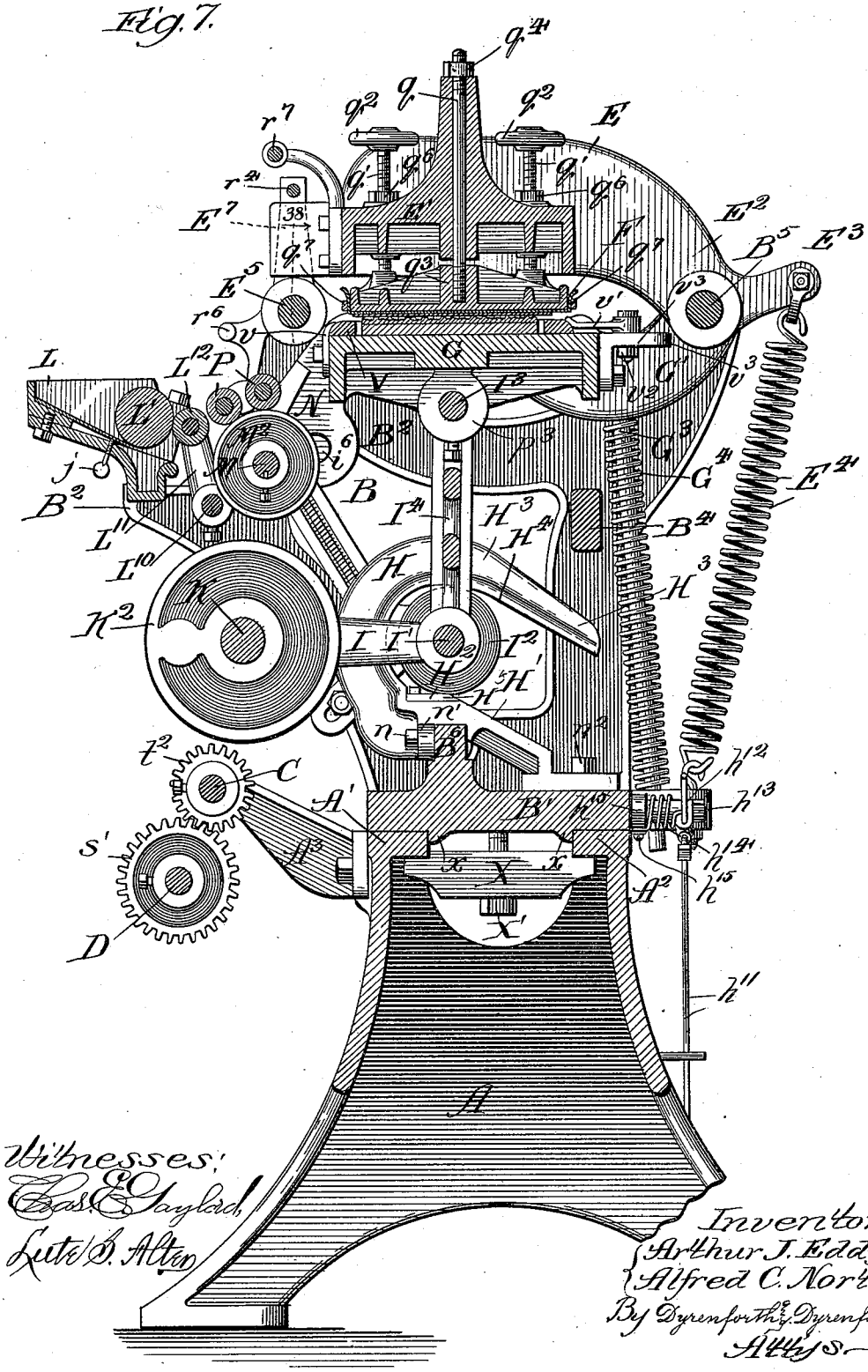
Fig. 7.



Witnesses:
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A. J. EDDY & A. C. NORTH.

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No. 548,357. Patented Oct. 22, 1895.

Fig. 8.

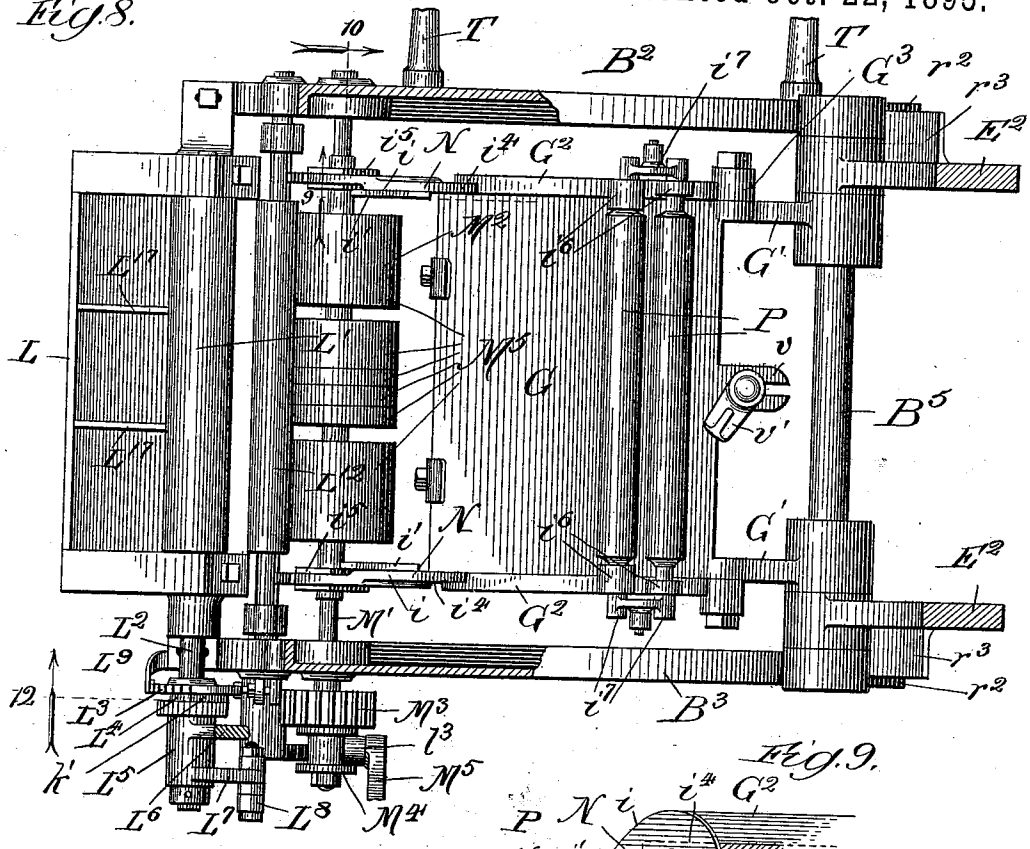


Fig. 9.

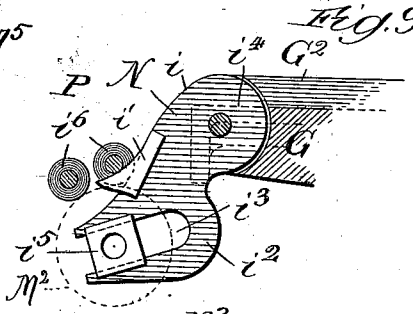
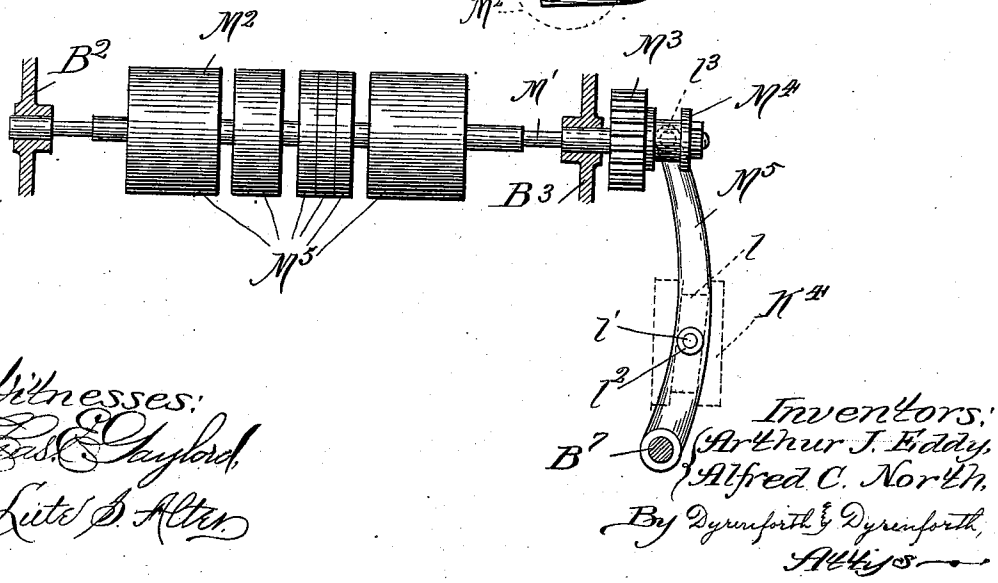


Fig. 10.



Witnesses:
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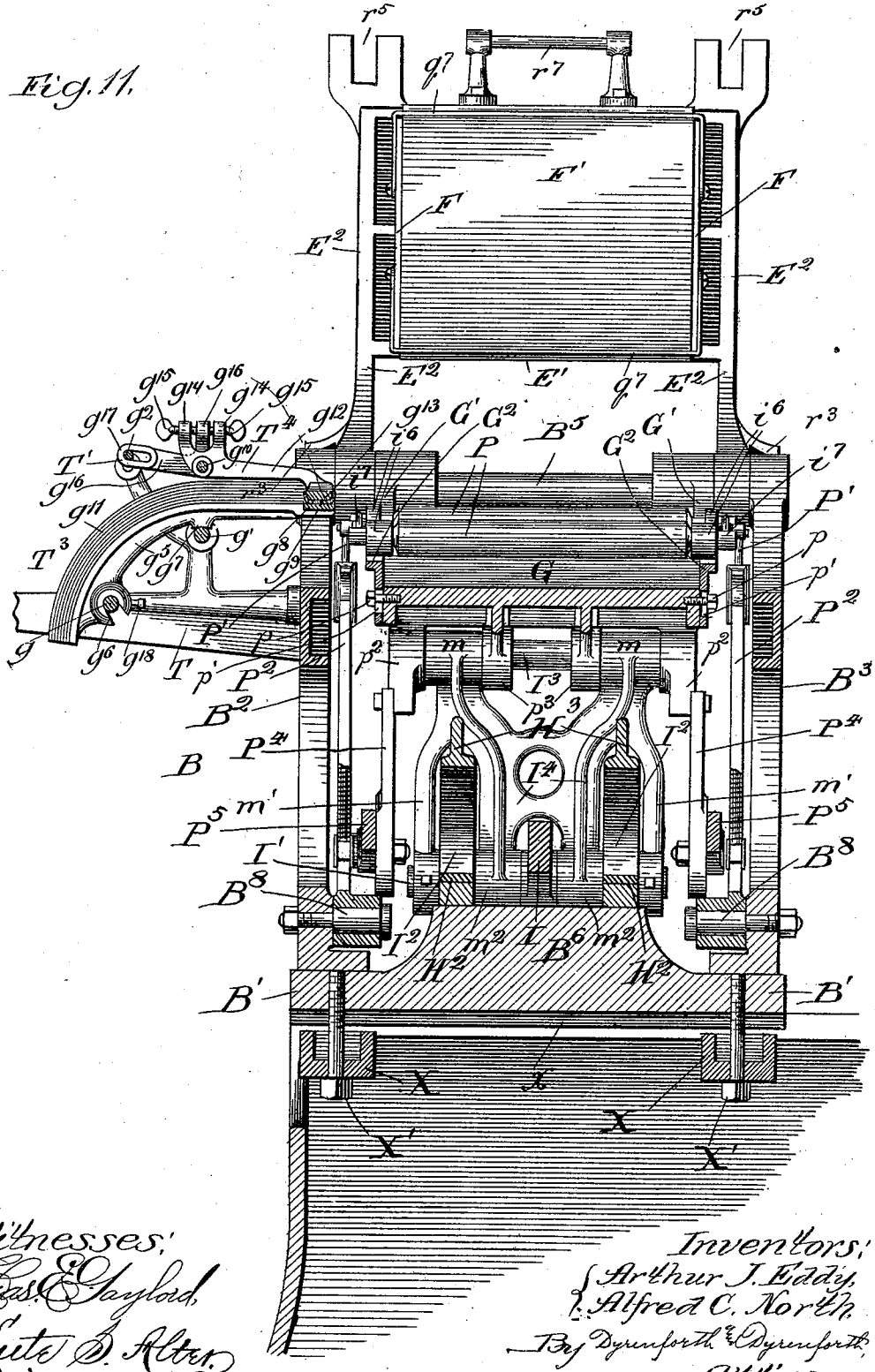
Fig. 11.



Witnesses:
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Fig. 12.

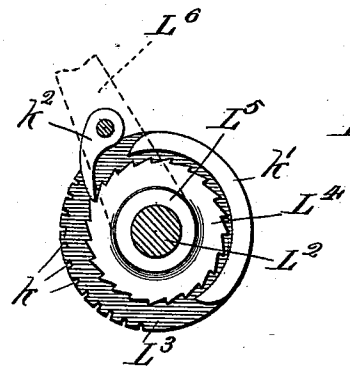


Fig. 13.

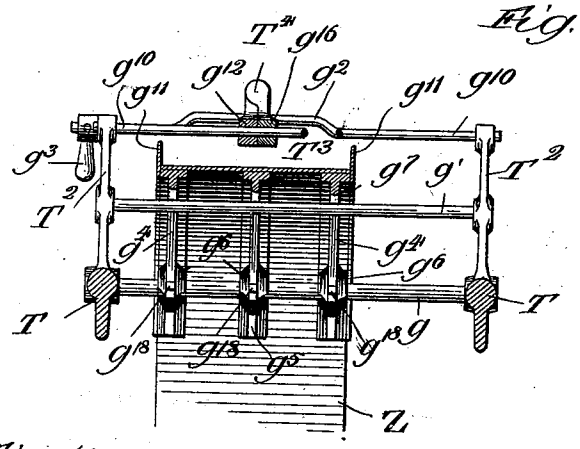


Fig. 14.

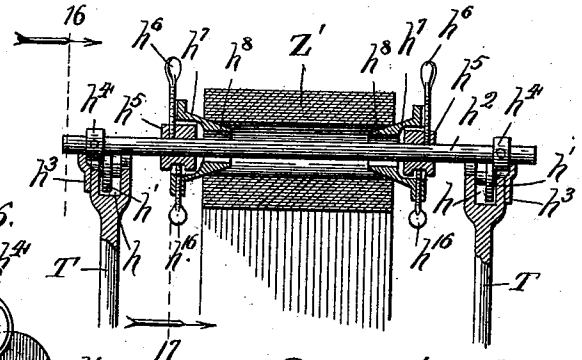
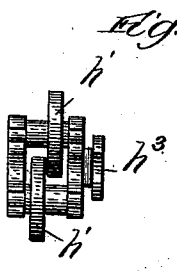


Fig. 15.



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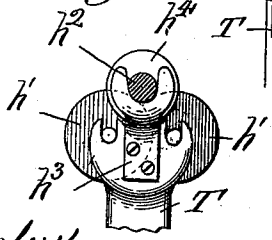

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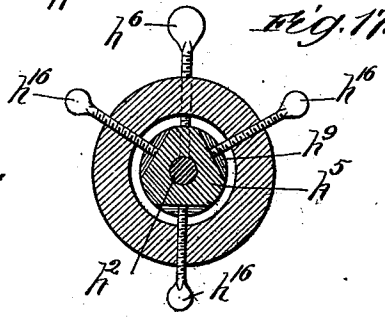

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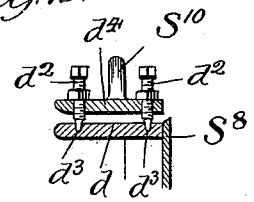
Fig. 19.



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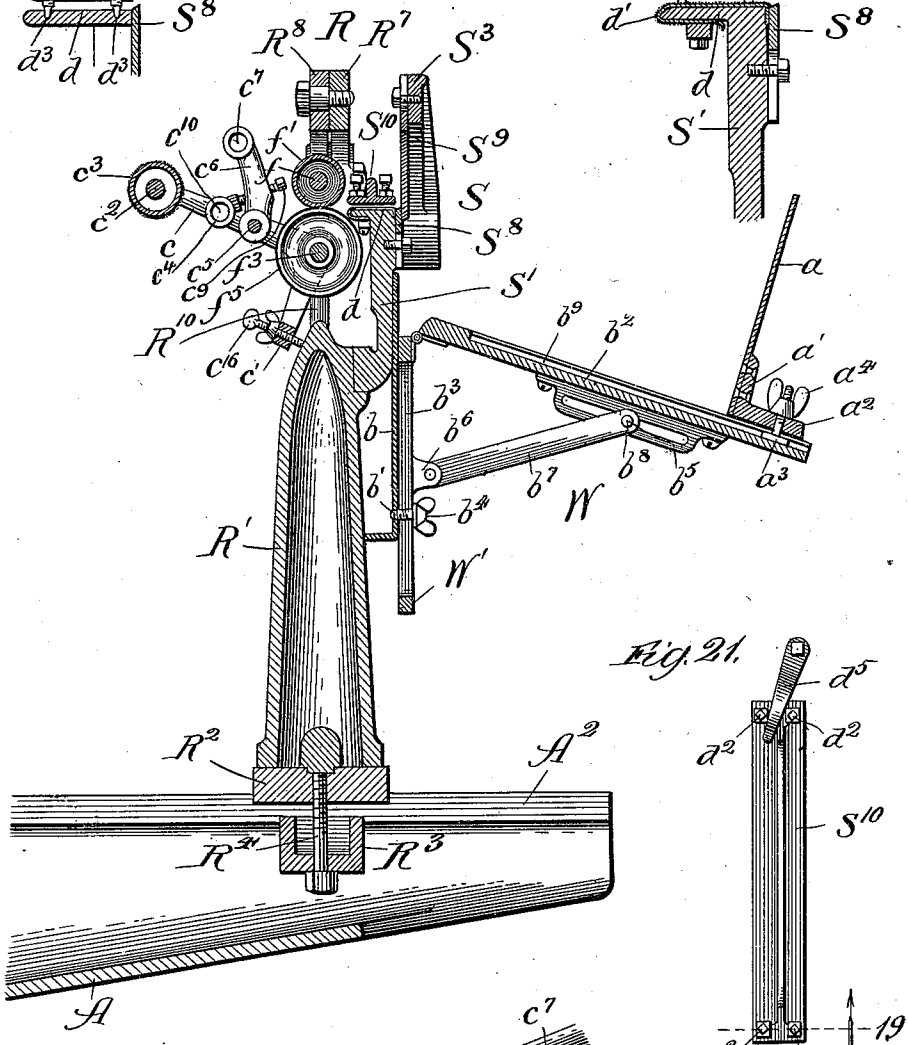
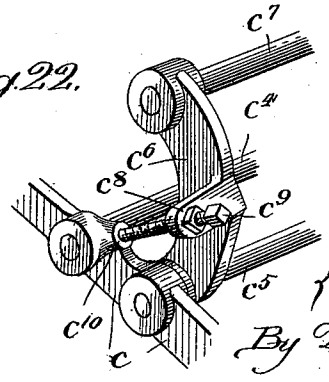


Fig. 20.

Fig. 21.

Fig. 22.



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A. J. EDDY & A. C. NORTH.

PRINTING MACHINE.

No. 548,357. Patented Oct. 22, 1895.

Fig. 23.

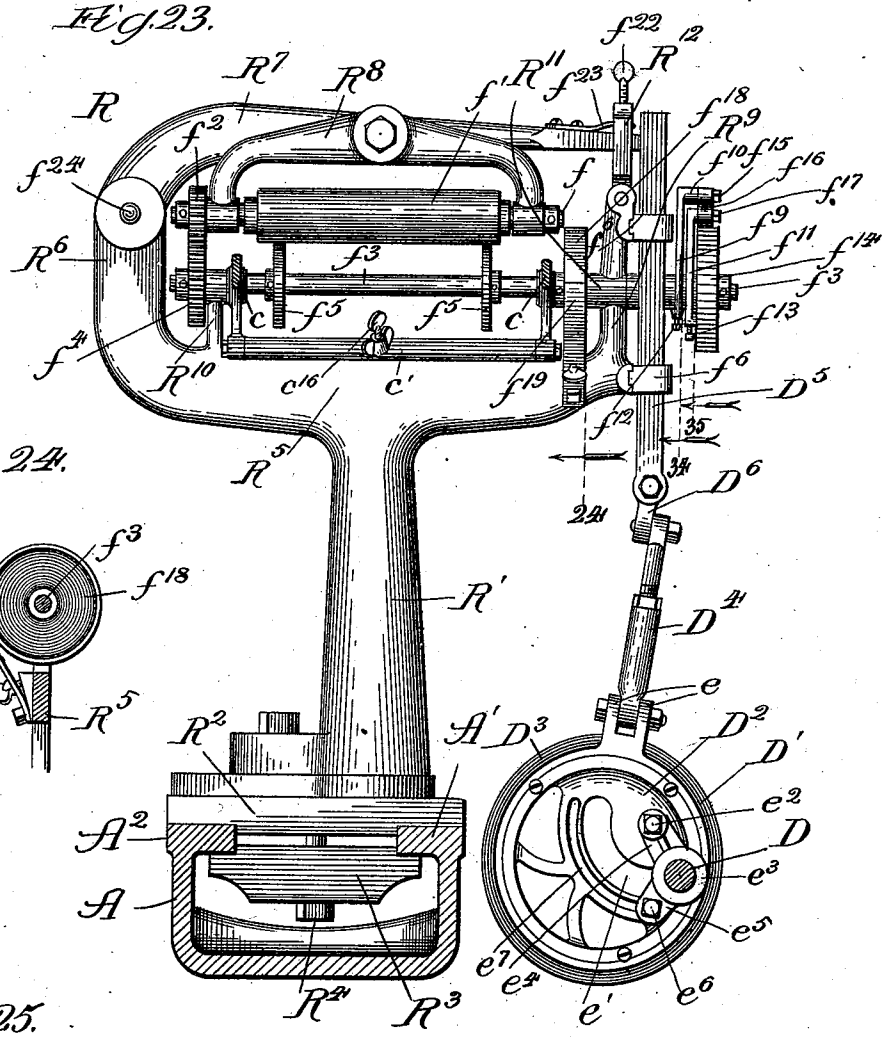


Fig. 24.

Fig. 25.

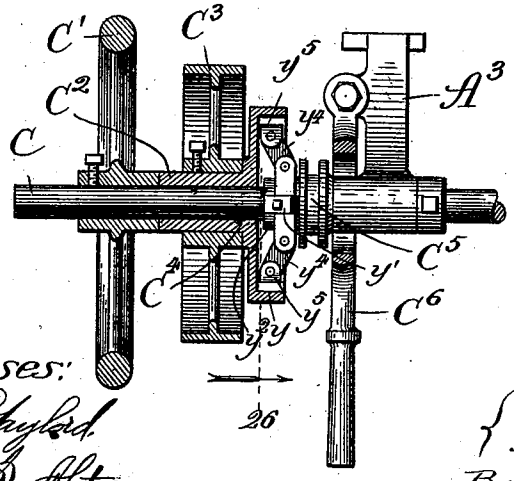
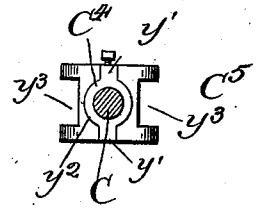


Fig. 26.



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No. 548,357. Patented Oct. 22, 1895.

Fig. 27.

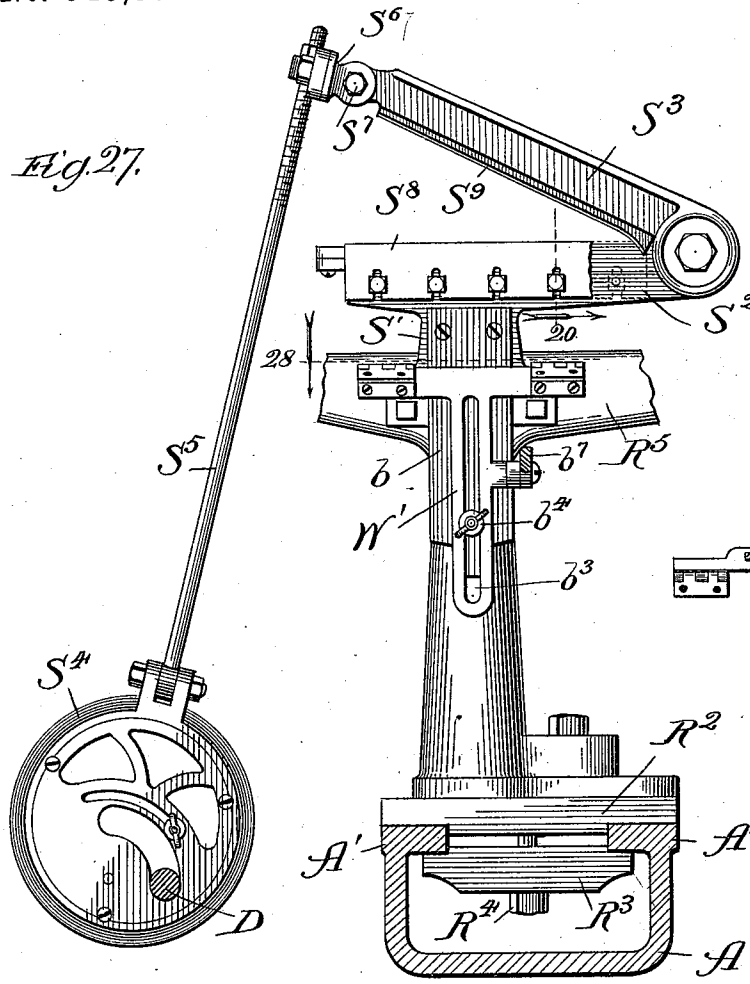


Fig. 28.

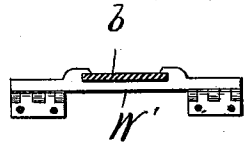


Fig. 29.

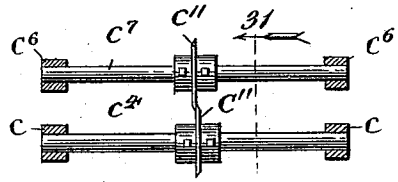


Fig. 30.

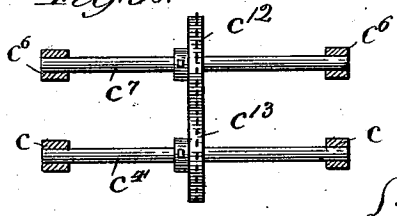


Fig. 31.

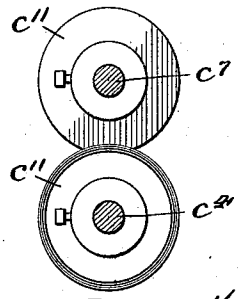
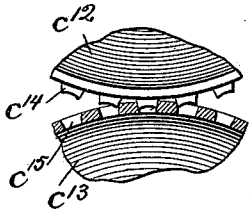


Fig. 32.



Witnesses:
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PRINTING MACHINE.

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Fig. 33.

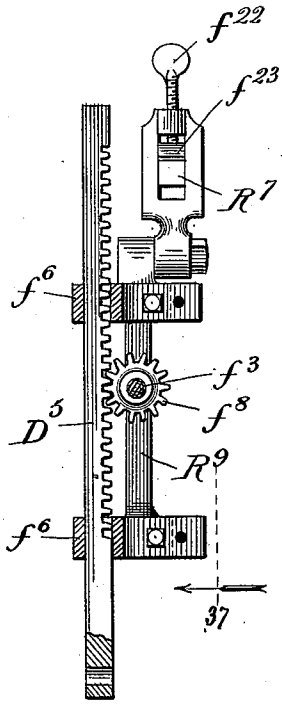


Fig. 34.

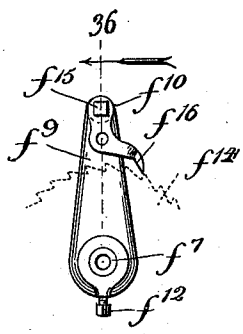


Fig. 35.

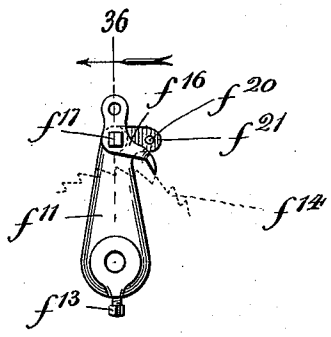


Fig. 36.

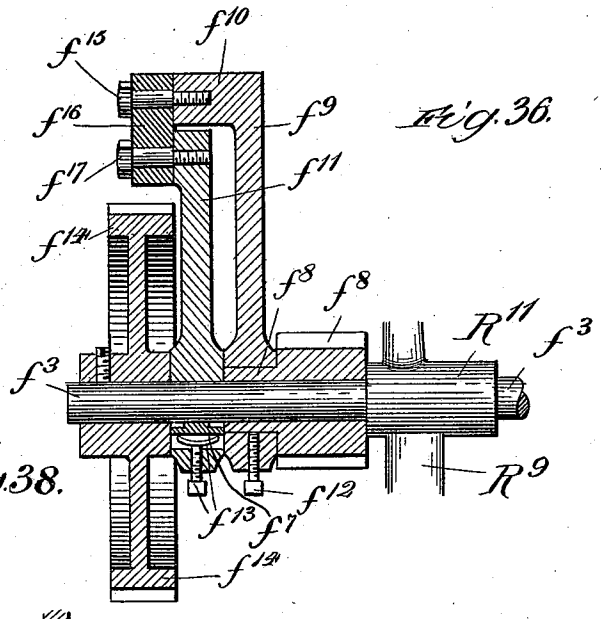


Fig. 37.

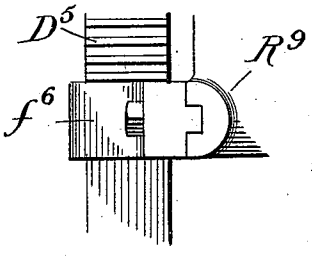
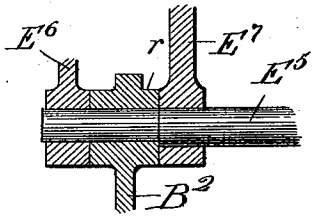


Fig. 38.



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Lutie D. Alter.

Inventors:
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Alfred C. North,
By Dyrenforth & Dyrenforth,
Attys.

ANDREW B. GRAHAM. PHOTO-LITHO. WASHINGTON. D.C.

UNITED STATES PATENT OFFICE.

ARTHUR J. EDDY AND ALFRED C. NORTH, OF CHICAGO, ILLINOIS; SAID NORTH ASSIGNOR TO SAID EDDY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 548,357, dated October 22, 1895.

Application filed February 14, 1894. Serial No. 500,171. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR J. EDDY and ALFRED C. NORTH, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

Our invention relates to improvements in printing-presses; and while certain features of the improvements are adaptable to printing-presses generally, other of the improvements relate especially to oscillating job-presses, and still others more particularly to oscillating web-printing presses.

Our object in the machine illustrated in the drawings and hereinafter described and which embodies all our improvements is to provide a comparatively simple, durable, and inexpensive web-feeding printing-press, which may be employed for substantially all classes of job-printing, whether in one or more colors, which may be easily and quickly changed from one class of work to another, and operate at high speed and comparatively noiselessly to turn out work of a high degree of perfection.

In the drawings, Figure 1 is a front elevation of our improved printing-machine; Fig. 2, a rear elevation; Fig. 3, a top plan; Fig. 4, an enlarged section taken on line 4 of Fig. 1; Fig. 5, an enlarged section taken on line 5 of Fig. 1, but showing the platen raised; Fig. 6, an enlarged section taken on line 6 of Fig. 1; Fig. 7, an enlarged section taken on line 7 of Fig. 1; Fig. 8, a sectional plan view taken on line 8 of Fig. 5; Fig. 9, an enlarged broken sectional view illustrating a detail of the construction, the section being taken on line 9 of Fig. 8 and viewed in the direction of the arrow; Fig. 10, a broken sectional detail view of a sectional inking drum or roller, taken on line 10 of Fig. 8 in the direction of the arrow; Fig. 11, a section taken on line 11 of Fig. 5; Fig. 12, an enlarged sectional view of a detail, the section being taken on line 12 of Fig. 8; Fig. 13, an enlarged broken section taken on line 13 of Fig. 1; Fig. 14, an enlarged broken section taken on line 14 of Fig. 1; Fig. 15, a plan view of an antifriction-bearing forming a part of the mechanism illustrated in Fig. 14; Fig. 16, an enlarged broken section on line 16 of Fig. 14; Fig. 17, an enlarged section taken on line 17 of Fig. 14; Fig. 18, an enlarged broken section taken on line 18 of Fig. 3; Fig. 19, a broken section taken on line 19 of Fig. 21 and enlarged; Fig. 20, an enlarged broken section taken on line 20 of Fig. 27; Fig. 21, an enlarged plan view of a detail of the mechanism shown in Fig. 18; Fig. 22, a broken perspective view illustrating a detail of the construction; Fig. 23, an enlarged section taken on line 23 of Fig. 1 and showing the intermittent feed for the web; Fig. 24, a section taken on line 24 of Fig. 23; Fig. 25, an enlarged broken section taken on line 25 of Fig. 1; Fig. 26, a section taken on line 26 of Fig. 25 and illustrating one of the details of a clutch mechanism; Fig. 27, a broken section taken on line 27 of Fig. 1 and showing a transverse web-cutting mechanism; Fig. 28, a section of a detail of the construction taken on line 28 of Fig. 27; Fig. 29, an enlarged section taken on line 29 of Fig. 1 and showing web-slitting disks; Fig. 30, a view showing the same parts as Fig. 29, with perforating-wheels in place of cutting-disks; Fig. 31, an enlarged section taken on line 31 of Fig. 29; Fig. 32, an enlarged broken and partly-sectional view of the perforating-wheels shown in Fig. 30; Fig. 33, an enlarged section taken on line 33 of Fig. 3 and showing a detail of the construction of the intermittent web-feed mechanism; Figs. 34 and 35, enlarged sectional views taken, respectively, on lines 34 and 35 of Fig. 23; Fig. 36, an enlarged broken sectional view of certain details of the intermittent web-feed mechanism, the section being taken on line 36 of Fig. 3, corresponding with line 36 of Figs. 34 and 35; Fig. 37, an enlarged broken elevation viewed from line 37 of Fig. 33, and Fig. 38 an enlarged broken section taken on line 38 of Fig. 7.

A is a base or supporting frame, made preferably in the form of a hollow casting and presenting parallel top rails A' A^2. B is the frame of the printing-machine, comprising a base-plate B' and cheeks or side frames B^2 B^3, respectively. The base-plate B' fits at its forward and rear edge portions upon the

rails A′ A^2 and is provided on its under surface with stops x x, which fit between the rails.

The press may be slid along the base to any desired position thereon and may be securely clamped in adjusted position by means of a clamping-bar X, which engages the under sides of the rails A′ A^2 and connects with the bed by means of a screw-bolt X′.

C is the drive-shaft, which extends beyond the forward end of the machine and is journaled in bearings afforded by crooked arms A^3 A^4, extending from the base A. On the outer end portion of the drive-shaft is a hand-wheel C′, and adjacent thereto is a loose sleeve C^2, (see Fig. 25,) carrying a power-pulley C^3. At its inner end the sleeve is enlarged and flanged to afford an annular inner friction-surface y, which gives to the sleeve the character of a clutch member. Fastened upon the shaft adjacent to the sleeve C^2 is a sleeve C^4, provided at opposite sides with short radial ribs or feathers y'. (See Fig. 26.)

C^5 is a sliding circumferentially-grooved wheel or clutch member having a sleeve portion y^2, which fits over the sleeve C^4, and is provided with longitudinal recesses to embrace the ribs y' of the latter. On opposite sides of the sleeve C^5 are projecting ears, affording between them sockets y^3, in which are pivoted short links y^4, carrying at their free ends pivotal shoes y^5. Pivotally secured at one end to the arm A^3 is a clutch-shifting lever C^6, which between its ends surrounds the shaft C, and is provided with fingers y^6, (see Fig. 1,) which extend loosely into the circumferential groove of the sliding clutch member C^5.

The power to drive the machine is applied to the pulley C^3, and by movement of the lever C^6 in one direction the clutch member C^5 is forced into engagement at its shoes y^5 with the surface y of the sleeve C^2, causing the drive-shaft to rotate with the pulley. Movement of the lever C^6 in the opposite direction withdraws the clutch member C^5 from the sleeve or clutch member C^2 and retracts the shoes y^5 from the surface y, causing the pulley and sleeve C^2 to rotate loosely upon the shaft and the latter to remain stationary. On the drive-shaft beyond the arm A^4 is a pinion t, which drives the printing-press, as hereinafter described, and on the said shaft between its bearings are pinions t' t^2 t^3, respectively, of gradually-increasing diameters, each adjustable longitudinally of the shaft and provided with a set-screw for securing it in adjusted position.

Extending parallel with the shaft C and substantially the full length of the base A is an auxiliary or counter shaft D, journaled in the free end portions of the arms A^3 A^4 and in a bearing-arm A^5 on the end portion of the base A. On the shaft D between its bearings A^3 A^4 are pinions s s' s^2 of gradually-increasing diameter and adapted to engage, respectively, with the pinions t' t^2 t^3, being adjustable longitudinally of the shaft for that purpose and provided with set-screws for securing them in adjusted position. The pinions afford adjustable speed-altering gears between the shafts C and D.

The sides B^2 B^3 of the frame of the printing-press are bolted to the base-plate B′ and strengthened by means of a cross-bar B^4. The rear upper ends of the sides afford bearings for a round bar or shaft B^5, on which is pivotally mounted a platen-carrying jaw or frame E. The frame E is formed with a body portion or plate E′ and parallel arched side bars E^2, affording backward-extending arms, at the ends of which the frame is pivoted upon the shaft B^5. At their forward ends the bars E^2 are adapted to fit and rest upon surfaces r at the upper forward ends of the side frames. At the rear ends of the arms E^2 are backward extensions E^3. Pivotally connected at their upper ends to the extensions E^3 are spiral springs E^4, which at their lower ends are connected with lugs r' upon the rear edge of the base-plate B′. On the side frames, in the relative positions shown, are backward-extending ears or stops r^2, and on the side bars E^2 are laterally-extending ears or stops r^3.

The frame E may be swung from the position shown—for example, in Fig. 4—to the raised position shown in Fig. 5, wherein the stops r^3 come in contact with the stops r^2. The raising operation is rendered easy by the springs E^4, which tend to counterbalance the swinging frame.

Journaled in bearings at the upper forward ends of the side frames is a shaft E^5, which, beyond its bearing on the side B^2, is provided with a handle E^6. Pivoted upon the shaft E^5 are T-shaped arms E^7, between the head portions of which extends a rod r^4, affording a handle. The T-shaped arms E^7, which operate as fastenings for the swinging platen-frame E, fit at their stem portions into vertical recesses r^5 (see Fig. 11) in the ends of the side bars E^2, and their enlarged head portions extend above the said ends. The shaft E^5 is slightly reduced in diameter at the end portions, which pass through the bearings, as shown in Fig. 38, and the circumferential surface of the body portion of the shaft is eccentric with relation to the bearing ends, giving to the shaft the character of a cam. Turning of the handle E^6 in one direction causes the arms E^7 to be raised in the recesses r^5 to disengage their heads from the upper surfaces of the side bars E^2, whereby, by grasping the rod or handle r^4, the arms E^7 may be swung forward against stops r^6 on the side frames to release the platen-frame and permit the latter to be grasped at its handle r^7 and raised to the position shown in Figs. 5 and 11 to give free access to the oscillating bed of the press hereinafter described. When the platen-frame is swung down to its horizontal position against the surfaces r, it may be firmly locked in place by swinging the arms E^7 into the recesses r^5 and turning the shaft E^5 by means

of the handle E^6 to draw the arms in the downward direction and cause their heads to engage and clamp the side bars E^2 to the surfaces r.

The plate or body portion E′ of the swinging platen-frame has a vertical central opening for a platen-sustaining bolt q, threaded at opposite ends, (see Fig. 7,) and four vertical threaded openings equidistant from the center for platen-adjusting set-screws q', provided at their upper ends with hand-wheels q^2 and reduced in diameter at their lower ends. The plate affording the platen F of the press has a central threaded socket q^3 on its upper side, which engages the lower threaded end of the sustaining-bolt q. On the upper threaded end of the bolt is a nut q^4, which bears upon the upper surface of the plate E′, and may be turned to raise or lower the platen bodily. The set-screws q' extend at their reduced ends into sockets q^5 in the upper side of the platen, (see Fig. 6,) and are provided above the plate E′ with jam-nuts q^6. By turning the nut q^4 and hand-wheels q^2 the platen may be quickly adjusted over its entire surface with great exactness to regulate the impression. Pivoted to the platen at opposite ends are swinging stirrups q^7 for clamping a tympan F′ in place.

G is the oscillating jaw or bed of the press, having backward-extending arms G′, pivoted at their ends to the shaft B^5. Fastened against the lateral edges of the bed are side bars G^2, held adjustably in place by means of screws p, (see Fig. 11,) passing through vertically-elongated sockets p' in the side bars. The side bars afford tracks for the form-inking rollers, hereinafter described, to run upon, and may be raised and lowered with relation to the surface of the bed a distance limited by the length of the slots p' to regulate the pressure of the inking-rollers against the form.

Cast upon the upper surface of the base-plate B′ is a longitudinally-extending rib B^6. H H are stationary toggle-guides, each comprising a casting fitting at its under side, near the front over the rib B^6, to which it is secured by a bolt n, passing through a lug n' on the casting and terminating at the rear of its base in a plate which fits upon the base-plate B′, and is firmly secured thereto by a bolt n^2. Each guide H is preferably of the U shape shown, presenting a lower inclined bearing surface or plane H′, terminating at its upper end in a bearing surface or plane H^2, extending at an angle thereto and preferably parallel with the plane of the platen F, that being the plane at which the impression is made and having an upper overhanging arm or retainer H^3, presenting an inclined under surface or plane H^4, parallel with the plane H′. Cast integral with the side frame B^3 is a sleeve-bearing B^6 for a short horizontal shaft K. At the outer side of the frame the shaft is provided with a gear-wheel K′, which engages and is driven by the pinion t. On the opposite end of the shaft is a disk-wheel K^2.

I is a plunger or toggle-operating bar pivotally secured at one end upon the side of the disk K^2 and pivotally connected at its opposite end to a shaft I′ midway of the length of the latter. The shaft I′ extends through the guides H, and in the latter carries rollers I^2 of a diameter but slightly less than the distance between the inclined planes H′ H^4. On the under side of the bed-plate G are end lugs p^2 and intermediate lugs p^3, all in line with each other and affording end and intermediate bearings for a shaft I^3.

I^4 is a toggle bar or leaf comprising a frame, having upward-projecting bearing-arms m, which engage pivotally with the shaft I^3, fitting between the respective bearings p^2 p^3, arms m' at opposite ends engaging the ends of the shaft I′, and intermediate bearings m^2, which engage the shaft I′, at opposite sides of the plunger or toggle-operating bar I. The frame I^4 straddles and overrides the arms H^3 of the toggle-guides, the rollers I^2 being confined in the guides and against lateral play by the respective bearings m' m^2. In the rotation of the shaft K and disk K^2 the plunger-bar I is reciprocated. In the forward movement of the bar it draws the rollers I^2 up the inclined plane H′ to the horizontal plane H^2, thereby extending the toggle-leaf I^4 and raising the type-bed in the direction of the platen.

The parts are preferably so constructed with relation to each other that the rollers I^2 reach the plane H^2 a very little in advance of the angle of greatest extension of the leaf I^4 and just as the form starts to impress against the platen. In the final forward movement of the plunger the rollers rock upon the plane H^2 until the leaf I^4 reaches the angle of greatest extension. This change in direction of the rollers immediately increases the leverage of the parts, and consequently the power exerted against the bed, at the time of making the impression, when the greatest power is required. Thus it will be understood that in the final movement, during which the impression is made, the toggle-leaf and rollers operate as a toggle pure and simple, the rollers at that time being stationary (in the sense of not traveling) upon the verge of the plane H^2 and rock thereon in the nature of a lower toggle-leaf. While their own weight and the weight of the bed would tend to keep the rollers in contact with the plane H′ in the backward movement of the bar I, there is danger, when running at high speed, that the rollers in leaving the plane H^2 for the inclined plane will jump, however slightly, thereby jarring the parts and rendering the operation noisy. The arms H^3 hold the rollers to the surfaces H′, whereby jumping is prevented and the operation rendered practically noiseless. For convenience of construction and for purposes of durability the plane H^2 is afforded by short plates or shoes H^5 bolted in place. The shoes may be of hardened steel the better to withstand wear, and in case of wear at

their angles they may be removed and replaced with new shoes.

On the outer sides of the arms G′ are pivotal bearings for the upper ends of rods G³, which reciprocate through guide-openings in the lugs r' on the base-plate B′. Surrounding the rods G³, and confined between collars thereon and the lugs r', are springs G⁴, which thus operate to counterbalance the bed to assist the rise and resist lowering thereof. The mechanism described for oscillating the type-bed, on account of the comparative ease and smoothness with which it operates, permits the press to be run at a high rate of speed without noise or jarring of the parts.

Secured across the front of the machine in the position shown is an ink-fountain L, which may be of common construction. On the end portion of the shaft K, just beyond the gear-wheel K′, is a cam K³ of the form most plainly indicated by full and dotted lines in Fig. 4. Beyond the said cam, on the extreme end of the shaft K, is a wheel K⁴, provided with a peripheral cam-groove l. (See Figs. 1, 2, and 3.) Extending longitudinally across the rear edge of the fountain is a fountain-roller L′, the shaft L² of which extends beyond the side frame B³.

Mounted loosely upon the shaft L², just beyond the side frame B³, is a disk L³, provided in its periphery with a series of notches k on one side and at its opposite side with a laterally-extending segmental shoulder k'. (See Fig. 12.) Adjacent to the disk L³ and fixed to the shaft is a ratchet-wheel L⁴, over which the shoulder k' extends. Loosely mounted upon the end of the shaft L² is a sleeve L⁵, provided with a handle L⁶ and an arm L⁷, extending at an angle to the handle. The handle carries a pivotal pawl k^2 to ride upon the shoulder k' and engage the teeth of the ratchet L⁴. L⁸ is a rod (see Fig. 4) pivotally connected at its upper end to the free end of the arm L⁷. At its lower end the rod L⁸ is formed with a longitudinal loop k^3, which receives a pin or bolt k^4 on the side of the wheel K⁴. Fastened at its upper end to a pin k^5 on the rod and at its lower end to a loop k^6 on the pin or bolt k^4 is a spring k^7. In the rotation of the shaft K, and consequent rotation of the wheel K⁴, the pin k^4 engages the upper end of the loop k^3 and raises the rod L⁸ longitudinally to turn the arm L⁷ with the sleeve L⁵ and handle L⁶ upon the shaft L². In this movement of the handle L⁶ the pawl k^2 engages the ratchet L⁴ and turns it, the shaft L², and fountain-roller L′.

It is desirable in practice to regulate the distance of turning of the fountain-roller L′ with each operation, in order to regulate the quantity of ink taken by the roller from the fountain and fed to the next roller, as hereinafter described. For this purpose we provide a spring-catch L⁹, which is fastened at its lower end to the frame of the fountain L, and is adapted at its upper end to engage any one of the notches k in the disk L³. In the forward movement of the handle L⁶ the pawl k^2 rides upon the shoulder k' to the end of the latter, whence it drops to and engages a tooth of the ratchet. Thus the distance of rotation of the shaft L² and fountain-roller may be regulated by turning the disk L³ to cause the forward end of the shoulder k' to approach or recede from the point marking the forward limit of traverse of the pawl. By turning the disk L³ from the position shown in Fig. 12 toward the left the degree of rotation of the shaft L² with each operation will be reduced, and by turning the disk to move the shoulder to the right the degree of rotation given to the shaft and fountain-roller will be increased. When the disk L³ is adjusted to the position desired, it is held in adjusted position by engagement of the spring-catch L⁹ with the notch k, with which it registers. When the rod L⁸ is thrust upward by the movement of the pin k^4, as described, it moves against the resistance of the spring k^7, and when the pin k^4 releases the end of the loop the spring retracts the rod L⁸ and turns the sleeve L⁵, handle L⁶, and pawl k^2 to their initial positions, wherein the pawl rides upon the outer surface of the shoulder k' and the ratchet-wheel remains stationary.

Journaled upon the outer side of the side frame B³, in the position shown in Fig. 4, is an idle-pinion M, the teeth of which engage the gear-wheel K′. Extending at opposite ends through bearings in the side frames B² B³ is a rotary longitudinally-reciprocating shaft M′, carrying between its bearings an inking roller or drum M², which supplies ink to the form-roller. On the shaft M′, just beyond the side frame B³, is a pinion M³, engaging the idle-pinion M, and next to the pinion M³ on the end of the shaft M′ is a wheel M⁴, having a peripheral groove.

M⁵ is a curved oscillating bar pivotally connected at its lower end to a lug B⁷ on the side frame B³. Between its ends the bar M⁵ is provided with a laterally-extending pin l', carrying a roller l^2, which extends into and engages the cam-groove l of the wheel K⁴. At its upper end the bar M⁵ is provided with a pin carrying a roller l^3, which extends into and engages the peripheral groove of the wheel M⁴. In the rotation of the shaft K the shaft M′ is rotated by the gears K′ M M³, and is reciprocated in its bearings to a limited extent by the engagement of the bar M⁵ with the grooved wheel M⁴, the bar being oscillated by the cam-wheel K⁴.

Journaled at opposite ends in bearings in the side frames B² B³ is a rock-shaft L¹⁰, provided just within its bearings with short radially-extending arms L¹¹, which are fixed to the shaft. At their free ends the arms L¹¹ afford bearings for the opposite ends of a shaft carrying a conductor or ink-transferring roller L¹². Beyond the side B³ is a rocker-arm L¹³, fixed at its upper end to the shaft L¹⁰ and pivotally connected at its lower end to the lower end of a rod L¹⁴. At its opposite or upper end the rod L¹⁴ extends through and reciprocates

in a guide afforded by a lug or bracket B^7 on the side frame B^8. (See Fig. 4.) Between its ends the arm L^{13} is provided with a laterally-extending pin L^{15}, carrying a roller L^{16}, which bears against the cam K^3. The cam K^3 is provided with a reduced surface K^5, concentric with the shaft K, and an enlarged surface K^6, also concentric with the said shaft. On the rod L^{14} is a spring L^{17}, confined between the guide B^7 and a collar upon the rod, the spring operating normally to press the arm L^{13} at its free end in and downward direction and cause the wheel L^{16} to bear against the surface of the cam K^3. In the rotation of the cam the engagement of the roller L^{16} with the enlarged surface K^6 causes the arm to rock and rock the shaft L^{10} and arms L^{11}, whereby the ink-transferring roller L^{12} is swung into engagement with the fountain-roller L', and when the roller L^{16} bears against the reduced cam-surface K^5 and arm L^{13}, rock-shaft L^{10}, and arms L^{11} are rocked to carry the ink-transferring roller L^{12} into engagement with the inking-drum M^2.

From the foregoing description it will be understood that in the operation of the machine ink is taken from the fountain L by the fountain-roller L' and transferred from the said roller, by means of the vibrating roller L^{12}, to the rotary reciprocating drum M^2.

At opposite ends of the bed G are form-roller guides N. Each guide N is preferably of the form shown most clearly in Fig. 9, having the rounded end portion i^4, at which it is pivoted to the side of the bed, an edge, affording an outer track-rail i, a lip or projection affording an inner track-rail i', and a bifurcated end i^2 presenting a socket i^3. Loose upon the shaft M', beyond opposite ends of the drum M^2, are squared blocks i^5, having recesses at opposite edges in which the bifurcated ends of the guides N slide, as indicated. In the oscillation of the bed G the guides N oscillate at one end with the bed and slide back and forth at their opposite ends upon the blocks i^5, which oscillate upon the shaft M'. On the shafts of the rollers P are collars i^6, at which the rollers travel upon the tracks G^2 N. The collars i^6 on the forward roller P are wide to present wide treads, which will travel upon the rails i to the rails i' and then upon the rails i', while the collars i^6 on the rear roller P are arranged to travel in planes beyond the planes of the rails i'. The parts are so constructed and timed in their movements with relation to each other that the rails i' register exactly with the circumferential surfaces of the drum M^2 when the forward roller P in its movement in either direction is at the forward ends of the rails i'. Thus it will move from the rails i' to the drum M^2 and return to the rails without jar. The rails i in the same way register with the drum M^2 when the rear roller P leaves one for the other. Thus the rollers P will at all times travel upon smooth tracks without jarring. If three rollers P are employed, additional track-rails should be provided to register with the drum M^2 at the proper moments. Beyond their collars i^6 the shafts of the rollers P are journaled in pivotal heads i^7 on the upper ends of the longitudinally-movable rods P', carried by swinging arms P^2. Each arm P^2 is pivoted at its lower end to a bearing pin or bolt B^8 on the adjacent side frame of the machine. The roller-carrying rods P' extend through guides in the ends of the arms P^2 and are surrounded by confined springs in the usual manner, which tend to draw the rollers in the direction of the pivots B^8, and thus hold the collars or roller ends i^6 to the tracks on which they run. On the forward side of each arm P^2 is an extension or finger P^3.

Rigidly secured at their upper ends to the lugs p^2 on the bed are downward-extending arms p^4, provided at their lower ends with longitudinally-extending loops i^8. (See Fig. 5.) Pivotally connected at one end to the loops i^8 are links P^5, which at their opposite ends are provided with loops i^9, at which they are pivotally connected to the free end portions of the fingers P^3. In the movement of the type-bed in the downward direction the arms P^4 are swung downward and backward to draw the links P^5 in the backward direction and swing the arms P^2 in the backward direction on the pivots B^8, causing the rollers P to travel from the inking-drum over the tracks N G^2 across the form. In the movement of the type-bed in the upward direction the arms P^4 are swung at their lower ends in the forward upward direction, thrusting the links P^5 forward and swinging the arms P^2 in the forward direction, whereby the rollers move along the guides G^2 N to the inking-drum M^2.

The rear ends of the links P^5 may be pivotally secured at any location in the loops i^8, and may be secured at their forward ends to the fingers P^3 at any location in the loops i^9. Thus the throw of the arms P^2 and the distance of traverse of the rollers P may be regulated. For example, if the form to be printed is smaller than the capacity of the type-bed it may be locked down near the forward edge of the bed, and the links P^5 may be adjusted at their opposite ends to cause the rollers P to travel from the inking-drum to the end of the form and no farther.

In the oscillation of the type-bed the rollers are guided by their tracks, afforded by the rails G^2 and guides N, substantially in an arc, of which the pivots B^8 are the center. In other words, the rollers travel along a smooth track without turning any angles and in a path so nearly the arc of a circle that there is very little expansion and contraction of the springs in the arms P^2.

In oscillating presses the speed of the press is limited by the speed at which the form-inking rollers may safely travel, and, as in all other presses of which we are aware, the rollers have to travel around angles. The speed

at which such presses may be run is necessarily slow, for the reason that when running over angles the rollers will jump if traveling faster than a certain speed and will soon injure the parts by jarring. In our improved construction the speed at which the rollers may be caused to travel is practically unlimited, for the reason that they turn no angles and are held at all times securely to the tracks, and owing to this feature our improved press may be run to a speed approximating five thousand impressions an hour, as against about two thousand five hundred impressions, which latter is considered a very high speed for other oscillating presses. Besides the increased speed thus attained our improved construction causes the rollers to be practically noiseless in operation, a feature of advantage which other oscillating presses do not possess.

By reciprocating the inking-drum M^2 a perfectly-even distribution of ink is obtained, as it revolves and slides in contact with the ink-transferring roller L^{12} and the form-inking rollers P.

The inking-drum M^2 which we provide upon our press is formed, preferably, in separable sections M^5, which may be slid longitudinally along the shaft M′ and bunched together to afford a continuous inking-drum, or separated, as indicated in Figs. 8 or 10, when it is desired to print in different colors. As will be seen by referring to Figs. 8 and 10, the sections M^5 are of different lengths to permit separation of the sections at different parts with reference to the form upon the type-bed.

If it is desired to print in three colors, for example, the sections M^5 may be adjusted upon the shaft, as indicated in Fig. 8, and two sliding partitions L^{17} may be placed in the ink-fountain in the position shown to divide the different-colored inks from each other. As sliding partitions L^{17} have been employed in connection with fountains L before it is not thought necessary to illustrate them in detail. The different-colored inks taken by the transferring-roller L^{12} will be separated when received from the fountain-roller and the spaces or lines of separation will register as the transferring-roller comes into contact with the drum, with the spaces between sections M^5, which spaces in practice may approximate one-half an inch in length. The degree of reciprocation given to the drum by the cam K^4 and arm M^5 also approximates one-half an inch, or one-quarter of an inch in opposite directions from the central line of the color-separating spaces on the transferring-roller, so that in the reciprocation the inks on the transferring-roller are not caused to intermix at the edges. When the form-rollers P come into contact with the drum, the different-colored inks are transferred thereto and spread by the reciprocating drum in a manner to touch without overlapping. Thus on the form-rollers the different-colored inks will be divided by well-defined lines.

Our improved machine is adapted to print upon a web Z, unwound from a roll Z′, through the operation of intermittent-feed mechanism R, whence it passes to cutting mechanism S, which severs the web into sheets.

Secured upon the side frame B^2 of the machine are arms T T, toward the front and back of the machine, extending laterally in an upwardly-curved direction. At their free ends the arms T are bifurcated, (see Fig. 14,) to afford sockets h, across which extend short shafts, carrying overlapping wheels h' h', affording antifriction-bearings for the opposite end portions of a horizontal support or shaft h^2. On the outer sides of the arms T are upward-extending socket-pieces h^3 h^3, through which the opposite ends of the shaft h^2 extend, and upon the shaft between the socket-pieces and adjacent bearings h' are collars h^4, which fit between the said socket-pieces and bearings to prevent longitudinal play of the shaft. The sockets of the socket-pieces prevent lateral play of the shaft. The bearings for the shaft h^2 permit the latter to be rotated without apparent friction and to be readily lifted out of or inserted into place when desired.

The means for securing a roll Z′ upon the shaft h^2 comprises blocks or collars h^5, which may be slipped upon the shaft and fastened in adjusted position by means of thumb-screws h^6 and clamps h^7, which may be in the form of cone-shaped blocks having central longitudinal openings h^8, which at the small ends of the clamps fit loosely around the shaft and are enlarged at the large ends of the clamps to fit loosely over the blocks h^5. Extending through the enlarged end portions of the clamps h^7 are thumb-screws h^{16}, adapted to engage sockets h^9 in the blocks h^5, by means of which the clamps may be secured to the blocks h^5 and centered thereon with relation to the center of gravity of the roll. In placing a roll Z′ upon the shaft the clamps and one of the blocks h^5 are removed. The clamps are slipped into the ends of the roll and then slipped over the shaft. The blocks h^5 are then adjusted upon the shaft with the clamps and roll and fastened in position between the arms T in proper relation to the form upon the press. The blocks h^5 are then tightened upon the shaft and the clamps adjusted by means of the thumb-screws h^{16} to cause the center of gravity of the roll to coincide or register with the center of rotation of the shaft. From the roll the web passes down beneath an unwinder, consisting of an arm or roller h^{10} on the lower end of a downward-extending rod or lever h^{11}. At its upper end the rod is fastened upon a sleeve h^{12}, which loosely surrounds a pin h^{13} on the rear edge of the base-plate B′. Surrounding the sleeve h^{12} and fastened at opposite ends, respectively, to an adjustable collar h^{15} on the pin h^{13} and to the sleeve h^{12} is a spring h^{14}, which tends

normally to turn the sleeve upon the pin and press the rod h^{11} at its free end and the roller h^{10} in the downward direction. The collar h^{15} may be turned and adjusted upon the pin h^{13}, to increase or diminish the tension of the spring. The roller h^{10} extends in a plane parallel with the shaft h^2.

The intermittent feed for the web, when moving the latter forward between impressions, starts with a jerk upon the web, which, unless means are provided to prevent it, will have a tendency to tear the web before starting the unwinding of the roll. In our improved construction the unwinder h^{10} has the effect of producing what may be termed a "constant slack" between the roll Z′ and press, and in the initial tug produced upon the web by the feed it yields in the upward direction and exerts in its rise a constantly-increasing resistance, owing to its spring h^{14}, whereby the force exerted to turn the roll Z′ becomes a slow pull instead of a quick jerk, and by thus decreasing the strain upon the web prevents tearing of the latter. While an impression is being made the strain exerted by the unwinder h^{10} causes the roll to revolve and pay out the web, the unwinder descending to its initial position. In practice in a short time the impulses given to the roll cause the latter to revolve at the speed of the feed, and there will consequently be but a slight rise and fall of the unwinder.

Our construction involving the antifriction-bearings, means for finding the center of gravity of the roll, and the yielding unwinder are important features of our invention. When, owing to heavier or lighter paper, it is desired to increase or reduce the resistance of the unwinder, this may be done by adjusting the collar h^{15} upon the pin to increase or diminish the resistance of the spring h^{14}.

Fastened at opposite ends in the arms T, in the position shown, is a rod or shaft g, and upon the arms, between the said rod g and side of the machine, are upward extensions, affording fingers T′ T². At the junctions of the fingers T′ T² are bearings for a cross-rod g'. The fingers T′ afford bearings for the opposite end portions of a rocking crank-shaft g^2 and the fingers T² afford bearings for a cross-rod g^{10}. On the end of the shaft g^2, at the forward side of the machine, is a handle g^3. (See Figs. 1 and 13.) T³ is an adjustable curved web-guide comprising two sliding end guide-pieces g^4 g^4 and an intermediate sliding guide-piece g^5. The guide-pieces are provided on their under sides, near their lower ends, with socket projections g^6, (see Fig. 11,) which fit over the rod g, and at their centers they rest, at bearing-surfaces g^7, upon the rod g'. Secured to one of the end guide-pieces g^4 is a strip g^8, which rests and slides in recesses g^9 in the upper ends of the other guide-pieces. (See Figs. 5, 6, and 11.) On the outer edges of the guide-pieces g^4 are flanges g^{11}, affording edge guides for the web. T⁴ is an adjustable brake or tensioning mechanism for the web. It comprises a lever g^{12}, pivoted at one end portion upon the rod g^{10}, and carrying at its opposite end a strip g^{13}, which is preferably padded on its under face and extends parallel with the strip g^8, against the upper surface of which it is adapted to bear. Above the rod g^{10} the lever is provided with two lugs g^{14}, affording between them a socket, into which extend thumb-screws g^{15} from opposite sides. Pivoted upon the rod g^{10}, adjacent to the lever g^{12}, is a bell-crank lever g^{16}, which at one end extends into the socket between the lugs g^{14} and at its opposite end is formed with a loop g^{17}, through which passes the shaft g^2. The thumb-screws g^{15} bear against opposite sides of the end of the lever g^{16}, which extends between the lug g^{14}, whereby the levers g^{12} and g^{16} are practically one in operation.

The padded web-engaging surface of the part g^{13} may be pressed against the web at the strip g^8 or raised out of contact therewith by swinging the lever g^{12} g^{16}, forming the tensioner T⁴, upon the pivot g^{10}, this being accomplished by turning of the cam-shaft g^2 by means of the handle g^3. By turning the handle g^3 in one direction it turns the cam-shaft in the downward direction, swinging down the end portions g^{16} of the lever and raising the end portion g^{12} thereof to disengage the tensioning-bar g^{13} from the web, and turning the handle g^3 in the opposite direction causes the end g^{16} of the lever to be raised and the end g^{12} thereof to be lowered to press the tensioning-strip g^{13} against the web. The degree of pressure of the tensioning-strip against the web is regulated by means of the thumb-screws g^{15}, which may be turned to shift the end of the bell-crank-lever portion g^{16} to different positions between the lugs g^{14}, and thus change the relative angles of the parts or levers g^{12} g^{16}. The guide-pieces g^4 g^5 may be readily slid on their bearings g g' and secured in adjusted position by means of set-screws g^{18}. In practice they are so adjusted that the flanges g^{11} will be a distance apart equal to the width of the web and the guide-piece g^5 midway between them. The web-guide T³ terminates at the side B² in the plane of the under surface of the platen. The curved guide T³ directs the web from the unwinder to a plane at which it is to pass across the platen of the press, and the main object of providing the guide in the form shown and described is to cause the web to extend flatwise and not curl at the edges. Were the web fed in a straight line to the press, it would tend, especially in the case of thin paper, to curl at the edges, while in passing over a curved surface like that afforded by the guide T³ the tendency of the web to curl is overcome.

The intermittent-feed mechanism R for the web is mounted upon a standard R′, having a base-plate R², which at its opposite ends fits upon the rails A′ A² of the base A. The standard is clamped at its base upon the rails A′ A² by means of a clamping-bar R³, which

is tightened to the plate R^2 against the under sides of the rails by a bolt R^4. The upper end of the standard R′ is formed into a frame comprising a lower part or base-bar R^5, side bar R^6, and pivotal top bar R^7. Secured upon the forward face and center of the arm R^7 is a downward-extending yoke or stirrup frame R^8, which at its free ends affords bearings for a horizontal shaft *f*, provided between its bearings with a feed-roller *f′* and beyond one of its bearings with a pinion f^2. At the forward end of the base-bar R^5 is an upward-extending arm R^9. Journaled in a bearing R^{10} on the base-bar R^5, and in a bearing R^{11} upon the arm R^9, is a horizontal shaft f^3, provided at one end with a pinion f^4, engaging the pinion f^2, and provided between its bearings with web-feeding disks or wheels f^5 f^5, which bear normally against the roller *f′*.

On the counter-shaft D is an eccentric D′, having a rotary center D^2, surrounded by a ring D^3. Pivotally connected at its lower end to ears *e* on the ring D^3 is a pitman D^4. Crossing the middle of the center D^2 is a curved recess or opening *e′*, at which the said center fits over the shaft D. The opening *e′* describes the arc of a circle of which a bolt e^2 is the center. On the shaft D is a sleeve e^3, provided with a lug or arm e^4, pivoted upon the bolt e^2, and also upon the sleeve e^3 is a lug or arm e^5, provided with a bolt e^6, which passes through a recess or opening e^7 in the center D^2, describing an arc of a circle of which the bolt e^2 is also the center. The center D^2 may be adjusted to any position within the limits of its opening *e′* on the shaft D and may be firmly secured in adjusted position by tightening the bolts e^2 e^6. Thus the eccentric movement of the center D^2 and the consequent eccentric movement of the ring D^3 may be regulated by changing the relative positions of the center and shaft D. It will be understood that the center D^2 rotates in the ring D^3 and gives to the pitman D^4 a reciprocal motion in the vertical plane. D^5 is a vertically-reciprocating rack-bar movable in guides f^6 f^6 on the forward end of the bar R^5 and upper end portion of the arm R^9, respectively. The rack-bar is pivotally connected at its lower end by means of a link D^6 with the upper end of the pitman D^4. On the shaft f^3 is a loose pinion f^8, (see Figs. 33 and 36,) carrying a radially-extending arm f^9, provided at its free end with a laterally-extending finger f^{10}. Adjacent to the arm f^9 upon the shaft is an arm f^{11}, somewhat shorter than the arm f^9. The arm f^9 is secured to the pinion f^8 by means of a screw f^{12}, and the arm f^{11} is provided internally with a friction-block f^7, which is held yieldingly against the shaft by a set-screw and confined spring f^{13}, so that the arm f^{11} will, on account of the friction of the block against the shaft, move tardily with relation to the arm f^9. Secured to the shaft f^3, at the outer end of the latter, is a ratchet-wheel f^{14}. Pivoted at one end upon a bolt f^{15} on the finger f^{10} is a pawl f^{16}, pivoted between its ends to a bolt f^{17} on the free end of the arm f^{11} and adapted to engage the ratchet-wheel f^{14}. On the arm f^{11} is a finger f^{21}, carrying a pin f^{20}, which extends over the pawl.

In the rotation of the shaft D the eccentric is revolved to reciprocate the pitman D^4 and through the latter the rack D^5. In the upward movement of the rack it rotates the pinion f^8 and arm f^9, causing the latter to move in the direction of the arm f^{11} and dip the pawl f^{16} into engagement with the ratchet-wheel f^{14} and rotate the arm f^{11} on the shaft f^3, and also the ratchet-wheel f^{14} to turn the shaft. In the downward movement of the rack-bar it rotates the pinion in the opposite direction, causing the arm f^9 to be withdrawn in the backward direction slightly away from the arm f^{11}, raise the pawl out of engagement with the ratchet against the stop f^{20}, and swing the pawl and arm f^{11} to the initial position, ready to take a new grip upon the ratchet-wheel. In the return of the parts in the downward reciprocation of the rack-bar the shaft f^3 remains stationary. To prevent all danger of the shaft being rotated by inertia too far in the forward direction or in the backward direction by friction of the block f^7 upon the shaft, we provide a wheel f^{18} on the shaft f^3, having a circumferential friction-surface, and upon the bar R^5 we provide a leaf-spring f^{19}, which at its free end bears against the wheel f^{18}, thus operating as a brake.

Pivotally mounted upon the shaft f^3 is a frame consisting of side bars *c* in the form of bell-crank levers and a cross-bar *c′*, connecting the lower arms of the said side bars. Journaled at opposite ends in the free ends of the upper arms of the side bars *c* is a shaft c^3, carrying a guide-roller c^3 for the web. The circumferential surface of the roller c^3 is roughened or sanded. Journaled at opposite ends in the upper arms of the side bars is a shaft c^4, and extending between the same parts and parallel with the shaft c^4 is a rod c^5. Pivoted upon the rod c^5, near the ends of the latter, are adjustable swinging arms c^6, which at their free ends afford bearings for the opposite ends of a shaft c^7. On the arms c^6 are lugs c^8, having openings to receive adjusting-screws c^9, which extend through the said openings into internally-threaded swinging socket-pieces c^{10} on the outer ends of the shaft c^4. The shaft c^7 extends above and parallel with the shaft c^4, and the distance between the said shafts may be varied by turning the adjusting-screws c^9. The shafts c^4 c^7 may be provided, as shown in Fig. 29, with revolving co-operating cutting-disks c^{11} or with revolving co-operating perforator-wheels c^{12} c^{13}. The cutting-disks c^{11} have beveled circumferential cutting-edges, and when mounted upon the shafts are adjusted to overlap and bear against each other, as indicated in Figs. 29 and 31. The perforating-wheels are disks provided with circumferential flanges at one side. The flange of the disk c^{12} is provided

with radial cutting-teeth c^{14}, (see Fig. 32,) which fit and work in sockets c^{15} in the disk c^{13}. The teeth c^{14} produce perforations in the web, as the latter travels between them, by cutting pieces out of the web, the pieces dropping through the openings or sockets c^{15}. At the center of the cross-bar c' is a thumb-screw c^{16}, which bears against the surface of the standard R'. The wheel c^3 and cutting or perforating disks may be raised or lowered to a limited extent, with relation to the feed-rollers, by turning the screw c^{16}.

The arm R^7 is pivoted at f^{24} to the upper end of the part R^6, whereby it may be swung in the vertical plane. Pivoted upon the upper end of the arm R^9 is a swinging yoke-shaped latch R^{12}, adapted to swing over the free end of the arm R^7 and engage the latter. In the upper end of the yoke R^{12} is a thumb-screw f^{22}, and on the upper surface of the arm R^7 is a finger-spring f^{23}. To secure the arm R^7 down, the latch R^{12} is swung over the end thereof and over the free end of the spring f^{23}, and the thumb-screw f^{22} is screwed down against the spring f^{23}, whereby the arm R^7 is fastened down yieldingly at its free end, and thus causes the web-feeding roller f' to bear yieldingly upon the feeding-disks f^5. When it is desired to adjust the disks f^5, the thumb-screw may be loosened and the latch swung out of engagement with the arm, leaving the latter free to be raised on its pivot f^{24}.

Bolted upon the standard R' is an arm or plate S', having a T-head S^2, presenting a straight horizontal upper surface d. Pivoted at one end to the rear end of the head S^2 is a swinging arm S^3. On the counter-shaft D is an eccentric S^4, corresponding in construction with the eccentric D' described. Pivotally connected at its lower end between lugs on the ring of the eccentric S^4 is a rod S^5, threaded at its upper end. On the threaded part of the rod S^5 and adjustable thereon along the threads is a link S^6, which is removably pivoted by means of a bolt S^7 to the free end of the swinging arm S^3. Removably fastened upon the face of the head S^2 is a cutting-knife S^8 and on the arm S^3 is a cutting knife S^9, the knives affording co-operating shearing-blades for severing sheets from the web as it passes between them. Fastened over the surface d is a strip of paper or the like d', sanded or roughened on its upper surface. Above the roughened surface d' is a plate S^{10}, which may be mounted at opposite ends upon set-screws d^2, which rest in sockets d^3 toward opposite ends of the surface d. The under surface d^4 of the plate extends parallel with the sanded surface d', and the two surfaces afford between them a guide-passage for the web to the shearing-knives, and this guide-passage may be enlarged or reduced, according to the thickness of the web material, by means of the set-screws d^2. The plate S^{10} when inserted in place is slipped at one end under a spring d^5, Figs. 3 and 21, which operates to hold the plate in place.

Fastened at its upper end to the plate S' is a plate b, resting at its lower end against the standard R' and provided near said end with a threaded socket b'. W is the delivery of the press, comprising a platform b^2, hinged at one edge to the upper edge of a T-shaped frame W'. The stem portion of the frame W' is provided with a vertical slot b^3, which receives the shank of a thumb-screw b^4, which engages the socket b' in the plate b. On the under side of the platform b^2 is a longitudinally-slotted strip b^5. Pivoted at one end to an ear b^6 on the frame W' is a swinging arm b^7, provided at its free end with a screw b^8, which passes through the elongated opening in the strip b^5. The frame W' may be raised and lowered by loosening the thumb-screw b^4 and may be fastened in adjusted position by tightening the said thumb-screw. The platform b^2 may also be raised and lowered upon its hinges by loosening the screw b^8, so that it can be slid in the elongated opening, and the screw is tightened again when the platform has been adjusted to the proper angle. In the upper face of the platform b^2 is a T-socket b^9. Sliding upon the platform b^2 is a stop-plate a, fastened at its lower edge portion to a block a', having a base portion a^2. Fitting at its head in the T-socket b^9 is a bolt a^3, which extends at its shank portion through the base a^2, above which it carries a thumb-nut a^4. The stop a extends at a right angle to the platform b^2, and on loosening the nut a^4 it may be slid along the latter and fastened in adjusted position by tightening the said nut.

To place a form in the press, the platen-frame E is disengaged from its fastening at the forward end by turning the handle E^6, as described, and swinging the frame E^7 to the stops r^6. The platen-frame is swung upon its pivot B^5 until its stops r^3 engage the stops r^2, this operation being rendered easy by the counterbalancing-springs E^4. When the platen-frame is thus swung out of the way, free access may be had to the bed of the press, and the chase V, containing the form to be printed, is placed against chase-engaging stops v at the forward edge of the bed and fastened down by means of a pivotal latch or clamp v'. The stops v fit snugly over the rounded or beveled forward edge of the chase, and the clamp v' is pivoted upon a bolt v^2, which extends through a slotted bracket v^3 at the center of the rear edge of the bed. The clamp is swung upon its pivot to overlap and engage the rear edge of the chase and is fastened down by tightening the bolt v^2 to clamp the chase in place. The stops and clamp form a particularly desirable fastening means which may be quickly and easily adjusted and hold the chase firmly to the bed. The platen-frame is then lowered and locked down, as described, and the platen adjusted, if necessary, by means of the nut q^4 and screws q^2 to give the proper impression. If one form only is to be printed which sub-

stantially fills the chase from front to back and the printing is to be done in one color, the sections M^5 of the inking drum or roller M^2 are adjusted close together to afford a continuous circumferential surface, and the form-rollers P are adjusted by adjusting the links P^5, as described, to travel from the drum M^2 entirely across the bed. If a form is to be printed which extends materially short of the distance from the front to the back inner edge of the chase, the rollers P may be adjusted by means of the links P^5 to travel from the drum M^2 just far enough along the chase to ink the form.

For the reason, as before stated, that the speed of operation of the press is limited by the speed of the form-inking rollers by reducing the distance which the said rollers are to travel the speed of the press may be increased when small forms are to be printed. If two or more forms are locked side by side in the chase and are to be printed in two or more colors, the sections M^5 of the drum are separated as required, and partitions L^{17} are placed in the fountain L to divide the colors from each other. The roll of paper is then mounted upon the shaft h^2, as described, and the web is unrolled and passed therefrom under the unwinder h^{10} up over the curved guide T^3. The padded tensioning-strip g^{13} is raised by turning the handle g^8, as described, and the web is passed from between the tensioning-strip and the plate g^8, between the platen and bed of the press, over the roughened roller c^3. The arm R^7 is unlocked and raised, as described, and the web is passed between the feed-roller f' and feed-disks f^5 and through the opening between the plate s^{10} and roughened platform d' to the shearing-knives.

If the form in the press is to print one color, the web-feed mechanism must be adjusted to feed the web once with each impression a distance equal to the distance across the form and margins to be left upon the sheets, and the web-cutting mechanism must be adjusted to cut across the web once with each impression. If there are two forms upon the press printing in different colors and the printing is to be in two colors, then the feed must operate once with each impression and feed the web a distance equal to the distance between the forms.

If the press is to print several forms at once which are to be divided into separate sheets by the cutting mechanism S, then the web-feed must be operated to advance the web two or more times with each impression, as required, and the cutting mechanism must cut the same number of times. The distance of feed of the web is regulated by the adjustment of the eccentric D'. To diminish the throw of the eccentric, its center is adjusted upon the shaft D closer to the center in the opening e', as described, and to increase the throw of the eccentric it is adjusted in the opposite direction in the said opening. The throw of the eccentric regulates the distance of rise of the rack-bar D^5, and consequently the degree of rotation given to the feed-roller f' and feed-disks f^5. Thus the feed-rollers may be adjusted to advance the web to any extent with each operation.

The feed and cutting mechanism in the machine shown operates once with each revolution of the counter-shaft D. The pinions $s\,s'\,s^2$ on the counter-shaft are of such sizes with relation to the pinions $t'\,t^2\,t^3$ on the drive-shaft and gear mechanism between the drive-shaft and the oscillating bed that when the pinions $s\,t'$ are coupled into engagement the counter-shaft will rotate once with each oscillation of the type-bed, when the pinions $t^2\,s'$ are coupled into engagement the counter-shaft will rotate twice with each oscillation of the bed, and when the pinions $t^3\,s^2$ are coupled into engagement the counter-shaft will rotate three times with each oscillation of the type-bed. Thus in the press shown either one, two, or three feeds and cuts may be exerted upon the web, as desired, with each impression.

If it is desired to slit or perforate the web, the cutter-disks c^{11} or perforating-disks are adjusted upon the shafts $c^4\,c^7$, as described, whereby the web as it is drawn across the disks between the shafts is slit or perforated, as the case may be. The tension-bar g^{13} is adjusted by means of the thumb-screws g^{15} to exert the desired pressure against the web and hold the latter taut between the strip g^9 and feed mechanism.

In operation the web travels from the press over the roughened roller c^3, which roller engages the under or printed side of the web. It is found in practice that a roughened or sanded roller c^3 does not take off the ink or smudge the sheet, while a smooth roller would have that objection. The feed-disks f^5 are adjusted far enough apart to engage the opposite edges of the web beyond the printed surface, so that while they engage and guide the web toward its opposite edges they do not come into contact with the printed surface. The web slides from the feed-rolls to the cutting-knives over the roughened surface d', whereby we have found the printed surface of the web is not injured, as it would be in sliding over a smooth surface at that point. As the sheets are severed from the web they drop upon the delivery W, the stop a being adjusted at a distance from the knives which will cause the edge of the severed sheet to fall upon the platform without sliding upon the sheet next below it. The platform may be raised and lowered, as described, when desired.

As an example of the work which may be performed by our press, constructed with the gear mechanism described, in the manfacture of tickets, tags, or the like, six forms may be locked in the chase and printed at one time, the web fed forward three times to each impression, the web slit or perforated longitudi-

nally, and the cutter-knives operated three times to each impression, or the tags, tickets, or the like may in three impressions be printed in three colors and cut and split or perforated.

Additional speed-altering gears may be provided, if desired, whereby the press may be caused to print additional forms and additional colors.

Our printing-machine is in the nature of an improvement upon the oscillating web-press for which Letters Patent No. 489,981 were granted January 19, 1893, to Alfred C. North, one of the present joint applicants. While in the patented press the web feeder and cutter were geared directly to the main driving-shaft and the press operated from an auxiliary or counter shaft between which and the main shaft were speed-altering gears substantially like those herein described, in the present machine the construction is reversed, the press being geared directly to the drive-shaft and the web feeder and cutter to the counter-shaft. The present construction has advantages over that of the patented press in the application and economy of power as well as in the matter of speed. In the former press the ink-supplier, in the form of an inking-table, was carried by the oscillating bed, while the present construction relieves the bed of the weight of the ink-supplier and permits us to employ the fountain and fountain-rollers, as described, which afford a continuous ink-supply. The ink-fountain L in practice usually requires frequent adjustment by means of its thumb-screws *j* to regulate the flow of ink, and were the fountain carried by the oscillating bed the adjustments could not be changed without stopping the press, which would be impracticable. In our improved construction we gain all the advantages of a continuous ink-supply without adding to the weight of the oscillating bed. By the statement that the ink-supplier is relatively stationary is meant that the ink-supplier does not oscillate with the type-bed. The ink-supplier may have independent movements, as described in connection with the inking-drum, which reciprocates longitudinally to distribute the ink and rotates on its axis.

In the present construction the swinging form-roller-carrying arms are pivoted to and supported by the frame of the machine and are not carried by the oscillating-bed frame, one of our objects being to relieve the bed as much as possible from the weight of parts not necessarily carried thereby, and thus by making the bed as light as possible consistent with necessary strength the power required to operate the press is reduced approximately to the minimum.

The improved toggle mechanism described may be employed to advantage in other presses in which the bed and platen are mounted upon the opposite members of relatively opening and closing jaws, as in the present construction, and whether the bed or platen, or both, are oscillated into and out of the plane at which the impression is made.

To cause the toggle mechanism to operate as quickly and easily as possible and exert comparatively great power at the moment of impressing, we prefer to provide a straight inclined guide-surface H′, and a guide-surface H^2, exactly parallel with the plane at which the impression is made, which the rollers just reach and rock upon in the final extension of the toggle-bar. Thus while the impression is being made the rollers have the character of a lower pivotal toggle-leaf fulcrumed upon the surface H^2. Though this is the preferred construction, the guide-surface H′ may be rounded, instead of straight and inclined, to extend obliquely to the plane of impression in the arc of a circle or otherwise, if desired. As the rollers may merely touch and rock upon the surface H^2, the latter may be of merely appreciable area, and, as in the case of a rounded guide-surface H′, may be simply the nearest approach in a rounded plane or arc of a circle to the plane at which the impression is made.

While we prefer to construct our improved machine throughout as shown and described, it may be modified in the matter of details 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, adapted to print upon a continuous web, the combination with the supporting-frame, of a printing-press, a web-feeder and a web-cutter thereon, a driving-shaft to which the printing-press is geared, an auxiliary-shaft to which the web-feeder and web-cutter are geared, and adjustable speed-altering gear between the driving-shaft and auxiliary-shaft, substantially as and for the purpose set forth.

2. In a printing-press, in which the type-bed and platen are upon the opposite members of relatively opening and closing jaws, the combination, with the drive-shaft, of toggle-mechanism, for oscillating one of the jaws into and out of the plane at which the impression is made, comprising a toggle-bar at one end pivotally engaging the said jaw, a guide for the free end of said bar, having a bearing surface, oblique with relation to the plane of impression, terminating in a bearing surface approximately parallel with the said plane of impression, and operating means, actuated from the said drive-shaft, to move the toggle-bar along the said oblique surface to and upon the said parallel surface, substantially as and for the purpose set forth.

3. In a printing-press, in which the type-bed and platen are upon the opposite members of relatively opening and closing jaws, the combination with the stationary frame of the machine, of means, interposed between the said jaw and stationary frame, for moving one of the jaws into and out of the plane of impression, said means comprising a toggle-bar piv-

oted at one end to swing at its opposite end, operating means connected with the toggle-bar for swinging it on its pivot, and a guide for the swinging end of the toggle-bar having an inclined bearing surface over which the swinging end of the toggle-bar moves to move the said jaw toward the plane of impression, and having a bearing surface, at an angle to the said inclined surface, over which the said toggle-bar moves while the impression is being made, substantially as and for the purpose set forth.

4. In a printing-press, in which the type-bed and platen are upon the opposite members of relatively opening and closing jaws, the combination with the stationary frame of the machine, of means, interposed between the said jaw and stationary frame, for moving one of the jaws into and out of the plane of impression, said means comprising a toggle-bar pivoted at one end to swing at its opposite end, a roller on the swinging end of the toggle-bar, operating means connected with the toggle-bar for swinging it on its pivot, and a guide for the swinging end of the toggle-bar having an inclined bearing-surface upon which the said roller moves to move the said jaw toward the plane of impression, and having a bearing-surface, at an angle to the said inclined surface, upon which the said roller moves while the impression is being made, substantially as and for the purpose set forth.

5. In a printing-press, in which the type-bed and platen are upon the opposite members of relatively opening and closing jaws, the combination, with the drive-shaft, of toggle-mechanism, for oscillating one of the jaws into and out of the plane at which the impression is made, comprising a toggle-bar, at one end pivotally engaging the said jaw, a roller upon the free end-portion of said bar, a guide for the roller, having a bearing surface H′ oblique with relation to the plane of impression terminating in a bearing surface H^2, approximately parallel with the plane of impression, a reciprocable toggle-operating bar pivotally connected with the free end-portion of the toggle-bar, and reciprocating means for the toggle-operating bar, actuated from the said drive-shaft, substantially as and for the purpose set forth.

6. In a printing press, in which the type-bed, and platen are upon the opposite members of relatively opening and closing jaws, the combination, with the drive-shaft, of toggle-mechanism, for oscillating one of the jaws into and out of the plane at which the impression is made, comprising a guide, having a bearing surface H′ oblique with relation to the plane of impression terminating in a bearing surface H^2 approximately parallel with the said plane of impression, and a retainer H^4 approximately parallel with the surface H^2, a toggle-bar pivotally connected at one end with the said jaw, and provided at its free end with a roller fitting loosely between the surface H′ and retainer H^4, and toggle-operating means, actuated from the said drive-shaft, to move the free end of the toggle-bar on the roller along the bearing surfaces H′ H^2, substantially as and for the purpose set forth.

7. In a printing-press, the combination, with the stationary-frame, of a stationary horizontally disposed platen, an oscillating type-bed, and means, interposed between the frame and type-bed for moving the type-bed, comprising a guide, having an inclined bearing-surface terminating in an approximately horizontal bearing-surface, a toggle-bar pivoted at one end and movable at its opposite end upon said bearing-surfaces, and toggle operating means for moving the toggle-bar along said bearing-surfaces, substantially as and for the purpose set forth.

8. In a printing-press, the combination, with the stationary frame, of a stationary horizontally disposed platen, an oscillating type-bed, and means, interposed between the frame and type-bed for moving the type-bed, comprising a toggle-leaf, pivoted at one end to swing at its opposite end, a shaft mounted in the swinging end of the leaf and carrying rollers toward opposite ends, a reciprocable toggle-operating bar, engaging the shaft between the rollers, guides for the rollers, having inclined coincident bearing-surfaces and coincident bearing-surfaces at an angle to said inclined surfaces, and actuating-means for the toggle operating bar, substantially as and for the purpose set forth.

9. In a printing-press, the combination, of a stationary horizontally disposed platen, an oscillating type-bed, and means for moving the type-bed, comprising a rotary operating-shaft, a toggle-leaf pivotally connected at its upper end to the under side of the type-bed, and provided at its lower end with a roller, a guide, for the roller, comprising a block, having a base-portion provided with an inclined bearing surface H′ and approximately horizontal bearing surface H^2, and an arm having an inclined surface H^4, a reciprocable toggle-operating plunger-bar pivotally connected at one end with the lower end of the toggle-leaf, and connected eccentrically, at its opposite end, with the said operating-shaft, substantially as and for the purpose set forth.

10. In a printing-press, in which the type-bed and platen are upon the opposite members of relatively opening and closing jaws, the combination, with the driving-shaft, of a swinging toggle-bar, for oscillating one of the jaws into and out of the plane at which the impression is made, pivoted at one end to the said jaw and provided at its swinging end with a roller, means, actuated from the driving-shaft to flex and extend the toggle-bar, and a guide, for the swinging end of the toggle-bar, comprising a block having a base portion provided with a bearing surface H′, for the roller, oblique with relation to the plane of impression, and a removable shoe upon the base presenting a bearing surface H^2 for the roller, approximately parallel with the

plane of impression, substantially as and for the purpose set forth.

11. In a printing-press, the combination of an oscillating bed, a relatively stationary ink-supplier, a form-inking roller movable back and forth from the ink-supplier across the bed, and a guide for the form-roller, extending between the bed and ink-supplier, mounted at one end in pivotal relation to the ink-supplier and oscillating at its opposite end with the bed, substantially as and for the purpose set forth.

12. In a printing-press, the combination of an oscillating bed, a relatively stationary ink-supplier, a form-inking roller movable, back and forth, from the ink-supplier across the bed, and guides for the opposite end portions of the form-roller, each pivotally connected at one end to the swinging edge portion of the bed and pivotally connected toward its opposite end to the ink-supplier, and sliding longitudinally on one of its pivots, and affording a smooth track for the form roller between the bed and ink-supplier, in the oscillation of the bed, substantially as and for the purpose set forth.

13. In a printing-press, the combination, with the frame thereof, of an oscillating bed, a shaft mounted in stationary bearings in the frame and extending parallel with the bed, an ink-supply roller on the said shaft, a form-inking roller movable, back and forth, from the ink-supply roller across the bed, and guides, N, for the form roller, pivotally connected at one end with the type-bed, to oscillate therewith, having a pivotal connection at their opposite ends with the said shaft, and sliding longitudinally on one of their pivots, substantially as and for the purpose set forth.

14. In a printing-press, the combination, with the frame, of a bed oscillating into and out of the plane at which the impression is made, a shaft mounted in stationary bearings on the frame and extending parallel with the bed, an ink-supply roller on the said shaft, a form-inking roller upon a form-roller shaft, movable back and forth from the ink-supply roller across the bed, tracks at opposite ends of the bed for the form-roller shaft, and guides, N, for the form roller, pivotally connected at one end to opposite ends of the bed, connected at their opposite end-portions in sliding pivotal relation to the said ink-supply roller, and affording tracks, for the form-roller shafts, operating, in the movement of the bed to the plane of impression, to guide the form-roller in approximately the arc of a circle to the supply-roller, and, in the movement of the bed away from said plane, to register with the tracks on opposite ends of the bed and guide the form-rollers in the said arc to the bed, substantially as and for the purpose set forth.

15. In a printing-press, the combination with the oscillating bed, shaft M′ and rotary ink-supply roller thereon, and the form-roller, of guides N, affording tracks for the form-rollers, each pivoted at one end to the bed, and provided at its opposite end with a socket i^5 to engage the shaft M′, substantially as and for the purpose set forth.

16. In a printing-press, the combination, of an oscillating bed, a relatively stationary ink-supplier, form-inking rollers movable back and forth from the ink supplier across the bed, and guides, for the opposite ends of the form-rollers between the bed and ink-supplier, oscillating with the bed and presenting a separate track for each roller registering with the ink-supplier surface when the respective roller is at the point of reaching or leaving the supplier, substantially as and for the purpose set forth.

17. The combination, with the oscillating-bed, relatively stationary ink-supplier, and form-rollers P, P, of guides N, for opposite ends of the form rollers, having a track i for the rear roller P, and a track i' for the forward roller P, the tracks operating to guide the rollers, substantially as and for the purpose set forth.

18. In a machine adapted to print upon a continuous web fed thereto from a roll, a frame on the press, and laterally adjustable curved end web-guide pieces g^4 and an intermediate curved web-guide piece g^5 on the frame, substantially as and for the purpose set forth.

19. The combination, with its support, of a web-guide T^3, comprising adjustable curved end guide-pieces g^4, provided with guide-flanges g^{11}, an intermediate curved guide piece g^5, and means for fastening the guide pieces in adjusted position on the support, substantially as and for the purpose set forth.

20. In a printing machine, adapted to print upon a continuous web, the combination with the press and web feeder, of a web-guide presenting a bearing surface for the web adjacent to the press, and a web-tensioner comprising a pivotal lever provided with a web engaging bar to engage and clamp the web against the said bearing surface, means for turning the lever on its pivot to engage and release the web, and lever-adjusting means for regulating the pressure exerted by its web-engaging bar against the web, substantially as and for the purpose set forth.

21. In a printing machine, adapted to print upon a continuous web, the combination, with the press and web-feeder, of a web-guide presenting a bearing-surface for the web adjacent to the press, a frame at the said guide, a lever having an arm g^{12}, provided with a tensioning-bar g^{13}, to engage and clamp the web against the said bearing-surface, and an arm g^{16}, a shaft on which the said arms are pivoted, means, for securing the arms together, adjustable to change the relative angles of the arms, and a cam on the frame, engaging the arm g^{16}, operative to swing the lever and move the tensioning-bar into and out of engagement with the web, substantially as and for the purpose set forth.

22. In a printing-machine, adapted to print

upon a continuous web, the combination with the press and web-feeder, of a web-sustaining guide beyond the press, in the path of the web, provided with a sanded bearing surface for the web, substantially as and for the purpose set forth.

23. In a printing-machine, adapted to print upon a continuous web, the combination with the press and web-feeder, of a web-sustaining guide-roller between the press and web-feeder provided with a roughened circumferential bearing surface for the web, substantially as and for the purpose set forth.

ARTHUR J. EDDY.
ALFRED C. NORTH.

In presence of—
J. W. DYRENFORTH,
W. N. WILLIAMS.