E. G. CLARK.

STENCIL CUTTING APPARATUS.

APPLICATION FILED JULY 30, 1919.

1,377,979.

Patented May 10, 1921.

4 SHEETS—SHEET 1.

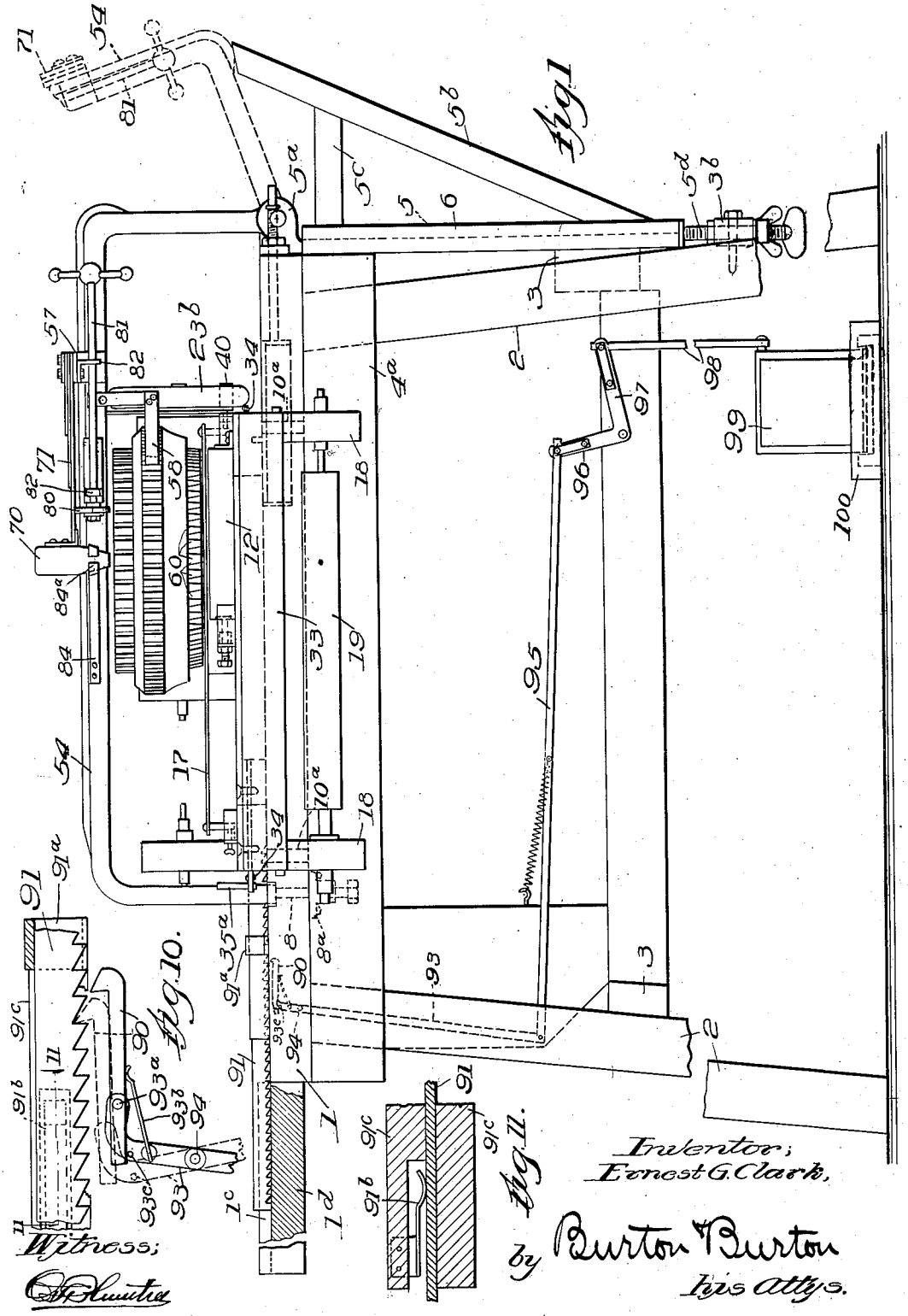


Fig. 1.

Fig. 10.

Fig. 11.

Witness;

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his attys.

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4 SHEETS—SHEET 2.

Fig. 2.

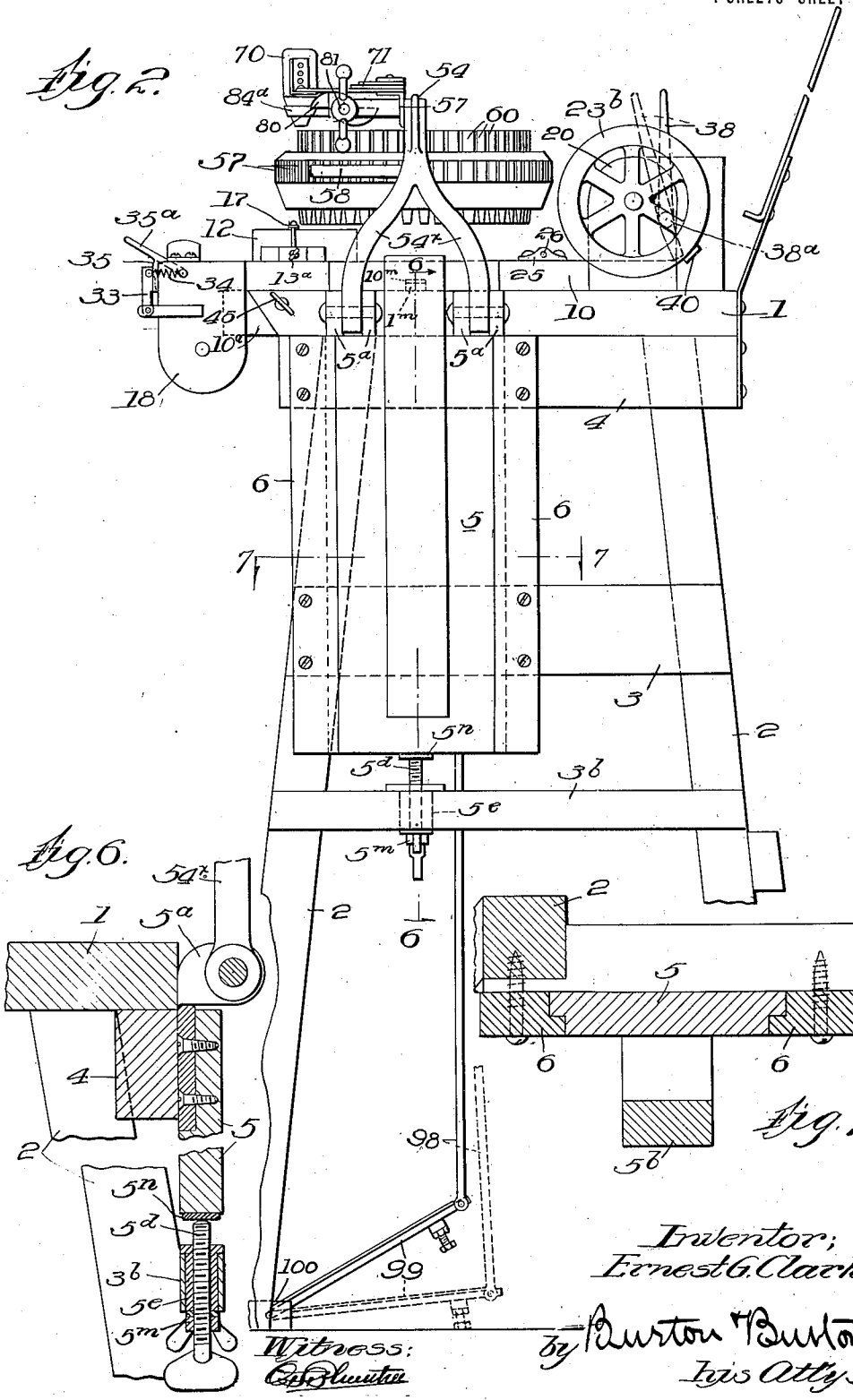


Fig. 6.

Fig. 7.

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4 SHEETS—SHEET 3.

Fig. 3.

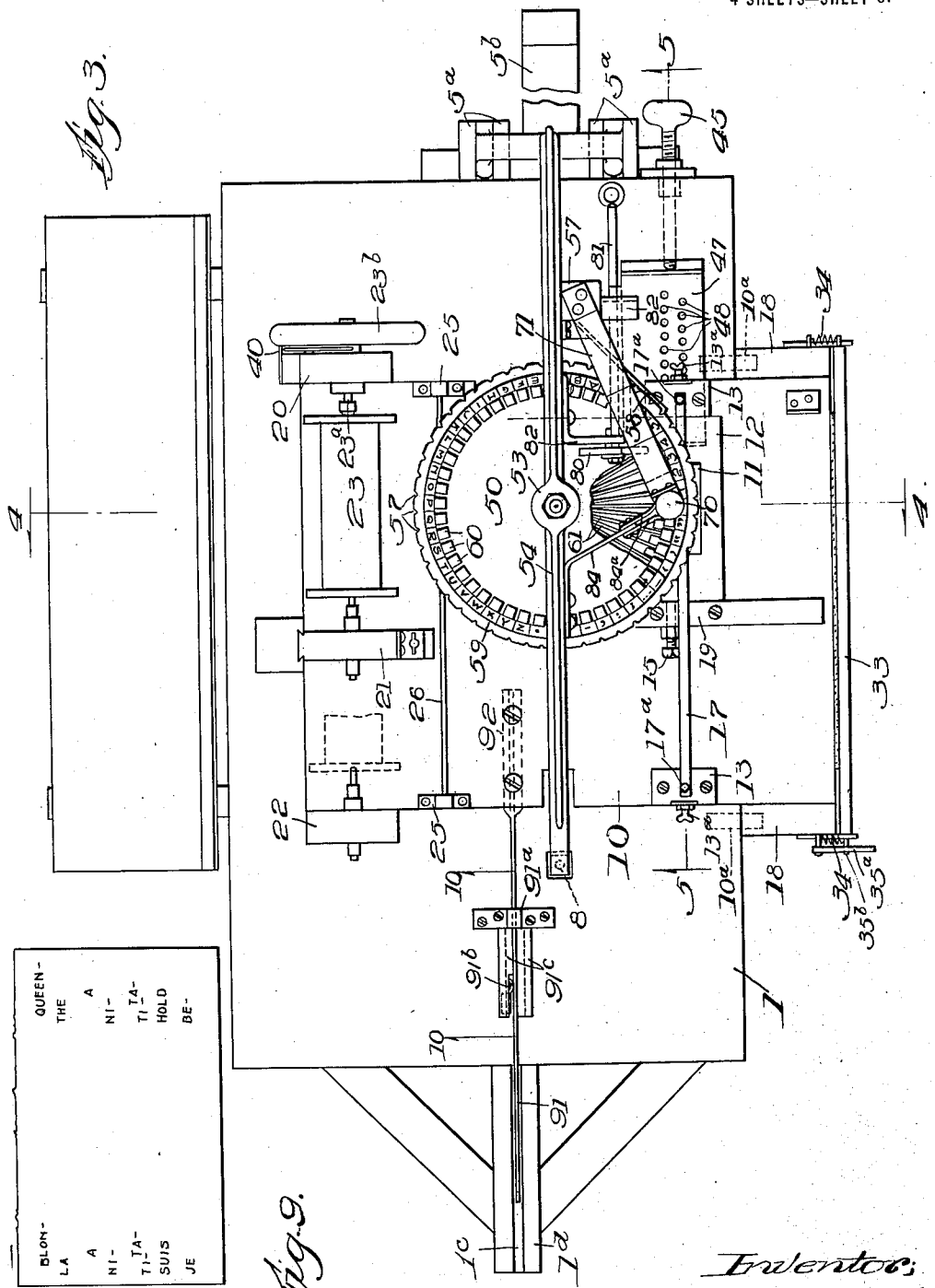


Fig. 9.

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4 SHEETS—SHEET 4.

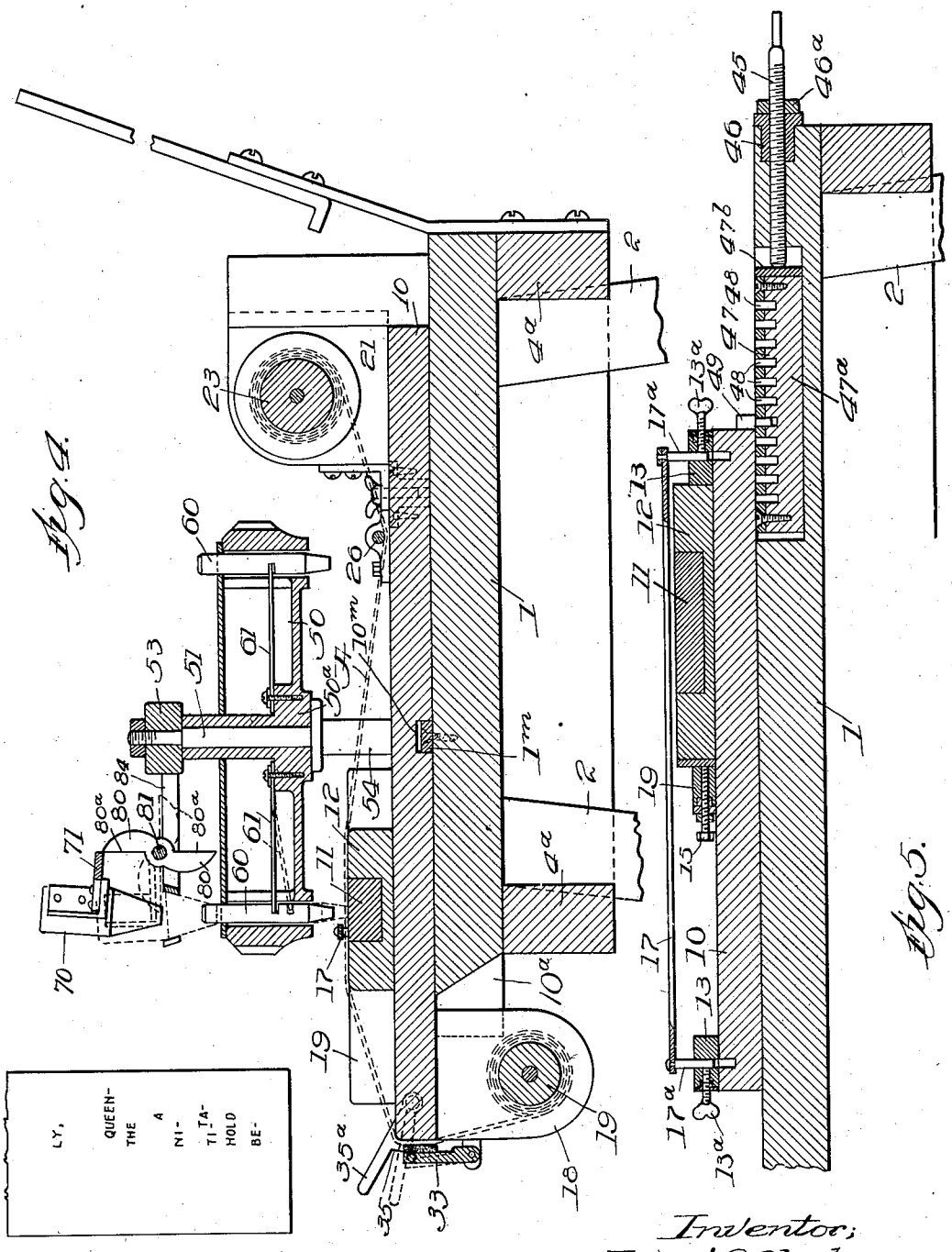


Fig. 4.

Fig. 5.

Fig. 8.

Witness;

Inventor;
Ernest G. Clark;
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UNITED STATES PATENT OFFICE.

ERNEST G. CLARK, OF DE KALB, ILLINOIS.

STENCIL-CUTTING APPARATUS.

1,377,979. Specification of Letters Patent. Patented May 10, 1921.

Application filed July 30, 1919. Serial No. 314,389.

To all whom it may concern:

Be it known that I, ERNEST G. CLARK, a citizen of the United States, residing at De Kalb, in the county of De Kalb and State of Illinois, have invented certain new and useful Improvements in Stencil-Cutting Apparatus, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide a machine for cutting the stencils which are to be used for stenciling words and figures on the marginal portions of perforated note sheets, commonly called music rolls, being the controllers for automatic players for musical instruments. It is not, however, limited in its applicability to this particular type of stencils. It consists in the elements and features of construction show and described, as indicated in the claims.

In the drawings:

Figure 1 is a front elevation of a machine embodying this invention.

Fig. 2 is a right-hand-end elevation of the same.

Fig. 3 is a plan view of the entire machine.

Fig. 4 is a section at the line, 4—4, on Fig. 3.

Fig. 5 is a section at the line, 5—5, on Fig. 3.

Fig. 6 is a detail section at the line, 6—6, on Fig. 2.

Fig. 7 is a section at the line, 7—7, on Fig. 2.

Fig. 8 is a plan view of single-column stencil and Fig. 9 is a plan view of a double column stencil of the character for cutting, which the machine shown is designed.

Fig. 10 is an enlarged detail section at the line, 10—10, on Fig. 2.

Fig. 11 is a detail section at the line, 11—11, on Fig. 10.

The general organization of the machine as shown in the drawings may be first stated. It comprises a main support on which there is mounted a carrier for a platen and for the rolls to and from which, respectively, the stencil web is wound, its paths between the two rolls crossing the platen, for receiving the stencil cutting produced by a punch which overhangs the platen. A carrier for a large number of punches, one for each letter and figure to be cut in the stencil, is carried by the main support, depending from the U-shaped arm or bow which strides the platen carrier. This punch carrier is mounted for rotation about its point of suspension, and has the punches in a circle about its axis of rotation, so that by turning it about said axis any desired punch can be brought into operative position upon the platen. The punches are each spring-supported in the carrier, and adapted to be driven against the web on the platen by a hammer which is carried on the end of a spring arm, which is put under tension by retracting the hammer, the hammer being tripped off at the limit of such retraction to deliver a blow upon the punch, which is of definite and uniform force in all cases, because the retraction, and consequently the tensioning of the spring arm of the hammer is uniform. An eccentric cam rotated by the operator serves for the retraction and tripping off of the hammer. As the markings to be imprinted upon the music rolls are in transverse lines, so the stencil cuttings on the stencil web must be in like transverse lines; and for cutting the successive letters or figures in these lines, the platen and stencil carrier is given a step-by-step feed movement transversely of the path of the web across it. For positioning the lines along the length of the web, the operator must be governed by the requirements of the perforations of the music roll, the words and figures to be printed upon the margin of the roll being positioned there-along opposite the perforations for producing the particular musical phases to which the words correspond; and for thus positioning the lines along the length of the web, the operator will feed the web by rotating the roll onto which it is to be wound in varying the amount from line to line, according to the required position of the lines on the web. In practice, the positions of the lines to be printed are indicated by first placing the uncut stencil web alongside the strip of perforated note sheets which is to receive the markings of the stencil, and the composer, or note-sheet-editor, pencils on the stencil web the words and figures to be cut at the positions substantially at which they are to be cut; and these pencilings are in view of the operator as he feeds the stencil web through the stencil cutting machine, guiding him as to positions at which the various lines will be cut.

In the drawings the main support is shown consisting of a top or bed member, 1,

and its supporting legs, 2, 2, 2, 2, tied together in pairs and reinforced by the crossties 3, at each end, and by the longitudinal sills, 4, and longitudinal tie bars, 4^a, connecting the legs at opposite ends. Upon this main support there is mounted slidably a tablet member, 10, hereinafter called the "platen carrier" or the stencil "roll carrier," because it carries the platen, 11, and also the rolls, 19 and 23, from and onto which a stencil web is wound in the operation of the machine. This platen carrier is transversely positioned and longitudinally guided on the bed, 1, of the main support, by engagement with the under-beveled front edge of the bed, 1, of the correspondingly beveled ends of brackets, 10^n, 10^n, secured to the under side of the forwardly-overhanging marginal portion of the platen carrier, 10, and also by the engagement of the ratchet toothed step feed bar, 91, secured to the under side of the carrier, 10, as seen at 92, in the channel, 1^c, of the extension bar, 1^d, which is rigid with the bed or tablet, 1, on the main support and the end of the latter, additional guidance is afforded by a bar, 1^m, engaging a groove, 10^m, in the under side of the platen carrier, 10.

On this carrier, 10, there is mounted, as mentioned above, the platen, 11, made of lignum vitæ, or like stubborn material, set in a holder, 12, of any convenient wood or other material. And there is also mounted on the same carrier the two rolls, 19 and 23, for the stencil web which is wound from the roll, 19, onto the roll, 23, in a path crossing the platen, 11. To insure the web lodging snugly on the platen, the latter is elevated as shown above the top surface of the carrier tablet, 10, and the roll, 19, is mounted in brackets, 18, depending from the carrier at the forward overhanging marginal portion thereof; so that the web runs from that roll up over the forward end of the carrier, and thence upward rearward to reach the top of the platen, from which it trends downward under a guide and check rod, 26, mounted in brackets, 25, 25, by which it is held just a little above the surface of the carrier tablet, to permit the web to pass under it and thence to the roll, 23, mounted in brackets, 22, erected on the rear part of the carrier tablet, 10. The stencil web, A, is designed to be fed longitudinally across the platen for exposure at the proper point to the stencil-cutting punches, as hereinafter more particularly described, by winding it by hand from the roll, 19, to the roll, 23; and for that purpose the roll, 23, has its driving spindle or chuck stem, 23^a, provided with a hand wheel, 23^b, for rotating it to wind the web onto the roll, 23, and off from the roll, 19. To hold the web taut on the platen, 11, there is provided a spring-actuated felt-lined clamping bar, 33, which is held by the springs, 34, 34, against the web as it passes around the front edge of the carrier tablet, 10, pressing it against that edge with a braking effect, requiring considerable stress to be exerted in winding the web onto the roll, 23; and to hold it taut when the operator stops winding to halt the web on the platen for being punched, there is provided a locking device to engage the hand wheel, 23^b, consisting of a friction brake spring bar, 40, carried on the bracket, 20, and bearing on the hand wheel, 23^b. A hand lever, 38, is fulcrumed at 38^a on the bracket, 20, which may be rocked from full line position shown in Fig. 2 to dotted line position in that figure to press the spring brake off the wheel. To admit the end of the web between the brake rod, 33, and the edge of the carrier tablet, 10, the brake bar is held away from the said edge by a cam, 35, carried by a release latch, 35^a, pivoted on the side edge of the carrier tablet, 10, and adapted to be swung down forward to rotate the cam in engagement with a pin, 35^b, which projects from the end of the bar, 33, as seen in Fig. 4. 17 is a stripper consisting of a bar which extends across the web quite close to the upper surface of the platen and near the punch to strip the web from the punch when the latter is withdrawn after its cutting action. It is convenient to have this stripper removable so as to avoid the necessity of introducing the end of the web under the stripper at starting; and to accommodate its removal and replacement, the stripper bar has at its ends transverse stems, 17^a, which enter sockets provided in the platen stop blocks, 13, which are secured on the surface of the carrier tablet, 10, thumb screws, 13^a, being provided to secure the stems and cause them to hold the stripper at the proper height to permit the web to pass freely under it and at the same time hold it down for stripping when the punch rises. When the web is to be introduced the left hand end of the bar is disengaged from the stem, 17^a, its engagement being by a notch in the bar engaging a reduced neck of the stem (see Fig. 5 and Fig. 9) and swing around horizontally on the other stem to clear the path for the web.

The platen holder, 12, is secured in place on the carrier tablet, 10, by being clamped against the stop bar, 13, at the right hand side by means of a clamp screw, 15, set through a block, 19^a, secured removably to the carrier, or to the opposite block, 13, the block, 19^a, being used with a short platen, such as is adapted for the narrow web required for stenciling on only one margin of the music roll, and being removed to permit the use of the set screw in said opposite block, 13, when a long platen needed for a wide stencil web is required for stenciling both margins of the music roll.

To afford a definite step for the move-

ment of the platen carrier cross-wise of the length of the web, so as to produce the stencil cuttings with a definite and uniform margin at the side of the web, and thereby produce the stencilings on the music roll with like definite and uniform margin, there is mounted in the main support bed, 1, a margin stop plate, 47, having holes, 48, in two rows, staggered so that utilizing the two rows, a stop pin may be located at any one of a succession of positions at intervals not greater than the diameter of the holes, 48,—say, one-sixteenth of an inch. A stop pin, 49, being inserted in one of these holes, determines the position of the right-hand edge of the carrier 10. For more exact positioning of the carrier, and to compensate for wear of the stop pin or of the abutting edge of the carrier, the stop plate, 47, has a short range of longitudinal movement along its seat in the bed, and is stopped at its right-hand end by an adjusting screw, 45, set into the edge of the bed which is provided with an embedded nut, 46, to hold the screw, a lock-nut, 46[a], being employed to secure the adjustment. As illustrated, this stop plate, 47, is secured by screws on the top of a wooden block, 47[a], which is of sufficient thickness and width to obtain a safe and durable slide-bearing in the bed, 1, and is provided at the outer end with a metal sheath plate, 47[b], to receive the thrust of the adjusting screw.

The punch carrier is a wheel, 50, turning on a vertical axle, 51, which is in the form of a headed bolt screwed into a boss, 53, positioned about midway in the length of an arch or bow or U-shaped arm, 54, which is pivoted at one end to a bracket on the main support, and strides the platen and roll carrier, 10. In this wheel, 50, in a circle about its axis, there are mounted for reciprocation parallel to said axis a multiplicity of punches, 60, each carried by a radially-extending flat spring arm, 61, secured at its inner end to the hub, 50[a], of the punch carrier. The punches are held by their spring arms, so as to normally have their lower cutting ends raised a little above the web on the platen. The hammer, 70, for driving the punches against the platen is carried by the spring arm, 71, preferably as shown consisting of a several-leaf spring secured to the bow or U-shaped arm, 54, a bracket, 57, mounted on the forward side of said arm being provided for so attaching the hammer spring arm. In order to obtain sufficient length of the spring arm, the bracket to which said arm is attached is shown at a considerable distance from the fore-and-aft vertical plane of the platen off toward the right hand end of the machine. The hammer head is mounted on a spring arm, and said spring arm is mounted on the U-shaped arm, 54, in such position that the head of the hammer normally stands a little above the head of the punch when the punch stands at its normal position with its lower end as described, raised a little above the platen. For operating the hammer there is provided a double eccentric cam, comprising two eccentric members, 80, 80, each having a radial shoulder, 80[a], said two shoulders being in the same diametric plane through the axis of the cam shaft, 81. Said shaft is journaled in bearing brackets, 82, 82, extended from the arm, 54, and the cam is positioned so that its eccentrics described engage under the spring hammer arm, flexing it upward as the cam is revolved and lifting it to the position shown in said Fig. 4, at which said spring arm runs off the eccentric engaged with the cam, and descends along the radial edge or shoulder, said spring arm being put under extreme tension in the flexing to which it is subjected by the lifting action of the cam, so that in its reaction, descending as described along said radial edge of the cam, it causes the hammer to deliver an effective blow to the punch. Both the punch and the hammer react after the blow to the normal position, the punch out of contact with the web and the hammer out of contact with the punch; but the reaction of the hammer due to the stiffness of its spring arm, and the extreme flexure to which it has been subjected, will tend to cause it to carry it much beyond its normal position, giving repeated blows to the punch. To prevent this result following the hammer blow, there is provided a friction spring device, 84, which consists of a strap or bar, 84, having one end secured to the bar, 54, and having at the end a spring fork comprising two spring fingers, 84[a], shaped to form reciprocal members of a frusto-conical fork or clasp positioned in the path of the descending hammer; and the lower end of the hammer is made similarly frusto-conical in form to enter said clasp as the hammer descends, spreading it and becoming frictionally engaged with it to such a degree as to materially retard the recoil of the hammer and prevent its recoil from carrying it materially beyond its normal position, thus preventing the repeated vibration back and forth and repeated strokes upon the punch which would otherwise occur.

In order to position the punches accurately below the hammer and above the platen for cutting the stencil openings at the right point in the web, the periphery of the wheel which constitutes the punch carrier has a notch, 57, opposite the position of each punch, and a spring dog, 58, depending from the arm, 54, is mounted to engage these notches respectively at the position of the wheel at which the respective punches are properly located for receiving the hammer stroke and cutting the stencil. The notches

and the engaging head of the spring dog are so correlatively shaped that the dog is disengaged by moderate force applied to turning the wheel or punch carrier. For convenience, the rim of the punch carrier wheel, 50, has its upper edge provided with a beveled zone, 59, on which are marked opposite the respective punches, the letters and characters which the punches are adapted to cut in the stencil web.

To facilitate introducing the stencil web across the platen and the commencement of the operation and in some cases its removal which will become necessary before it has been completely unwound from the roll 19, and wound onto the roll, 23, the U-shaped arm, 54, which carries the punch carrier is pivoted as stated at one end, and adapted to be swung up and over from the operative position of the punch carrier to a position shown in dotted line in Fig. 1, where it rests upon a support provided for holding it in this position, leaving the platen carrier and all parts thereon unobstructed for the placing of the stencil web in position. For thus pivoting the arm, 54, and at the same time providing for a limited amount of vertical adjustment which may be desirable to accurately position the punches with respect to the platen,—compensating for the variation and wear of the platen, and of punches as they may be reduced by grinding from time to time,—there is provided a bracket member consisting of a board, 5, having rabbetted edges engaged with reciprocally-rabbetted side bars, 6, 6, secured on the right hand end of the main support frame structure, as most clearly seen in Fig. 7; said board having the oblique bracing bar, 5^b, secured to it near the lower end, and extending thence upwardly and off to the right, as seen in Fig. 1, and provided with a tie bar, 5^c, connecting it at its upper end back to the board, 5. Pivot lugs, 5^a, are secured to the upper end of the board, 5, for affording pivotal connection of the lower right hand end of the U-shaped arm, 54, which is forked at that end, as seen in Fig. 2, the fork arms, 54^x, being pivoted respectively to the two pivot lugs, 5^a, secured as shown in Fig. 6, to the upper end of the board, 5. Upon the frame structure of the main support, as upon the tie bar, 3^b, which connects the legs, 2, 2, at the right hand side, there is mounted a supporting and adjusting screw, 5^d, said screw being set through a threaded sleeve or stud, 5^e, which is secured to said bar, 3^b; and said screw protruding through the upper end of said threaded sleeve or nut affords lodgment for the lower end of the board, 5, which is provided with a wearing plate, 5^n, to receive the thrust of the screw. The screw has preferably a wing head for operating by hand, and is provided with a wing nut, 5^m, serving as a jam nut to hold it securely in adjusted position. The opposite end of the U-shaped frame or bar, 54, is stepped on an adjusting screw, 8, set up through the bed, 1, on the under side of which there is mounted a fixed nut, 8^a, for said adjusting screw.

The step-by-step movement of the platen and roll carrier for moving the web one letter space at a time for cutting the successive letters or characters in a line, is performed by means of a spring-actuated pawl, 90, engaging the ratchet-toothed feed bar, 91, which is secured at 92, to the platen carrier, 10, and extends thence to the left along the top of the bed, 1, having its lower edge provided with the ratchet teeth. The bed, 1, is apertured under said ratchet toothed bar to admit the pawl, 90, and the lever, 93, by which it is carried, said lever being pivoted to the bed, 1, within the aperture, as shown at 94, and extending down for connection at its lower end with a link, 95, the right hand end of which is connected with the upstanding arm, 96, of the bell crank lever, whose arm, 97, is connected by a link, 98, with a pedal, 99, fulcrumed on a bracket block, 100, mounted on the floor on which the machine stands, in a position to be conveniently within reach of the foot of the operator while standing in front of the machine to manipulate the punch carrier for putting the proper punches into operating position. It will be understood that the pawl and ratchet step feed device is arranged to feed the platen carrier from right to left,—that is, in direction for cutting successive characters in a line to be read from left to right. The pawl is mounted on the operating lever 93, by a pivot, 93^a, about which it is pressed by the spring, 93^b, for the encounter of its lower edge with the stop pin, 93^e, and at this position of the pawl on the lever when the lever, 93, is in full line position shown in Fig. 1, the pawl is out of engagement with the teeth of the feed bar, 91; but, moving rigidly with the lever, 93, as it is rocked about its fulcrum, 94, to the dotted line position shown in said Fig. 8, the head of the pawl moving in an arc about said fulcrum, 94, advances upwardly to engagement with the ratchet bar, and upon further movement of the lever in the same direction, the lever rocking about its fulcrum, draws the pawl, now engaged with the ratchet bar, to the left, actuating the bar in the same direction for the step feed movement of the platen carrier which is desired. The pawl being, normally disengaged from the ratchet bar, the operator may at any time move the platen carrier in either direction,—to the right for restoring it to the starting position for a new line, or to the left for producing an interval between successive characters in the same line, or for passing to the opposite side of the stencil for cutting characters upon said

opposite marginal area. The ratchet bar, 91, is housed and held against displacement by the pawl action on it by a housing bracket, 91ª, mounted on top of the bed, 1. This housing limits the movement of the platen carrier to the left; and to check its movement under the feeding action of the pawl there is provided a spring brake, 91ᵇ, secured to one wall of a channel formed between two blocks, 91ᶜ, 91ᶜ, between which the ratchet bar slides, and holding the ratchet bar pressed against the opposite block.

I claim:

1. In a machine for the purpose indicated, in combination with a fixed support, a punch carrier mounted thereon for rotation about a fixed axis; a platen carrier mounted for movement along said fixed support, and a platen on said carrier; a pair of rolls from and onto which respectively a stencil web may be wound mounted on the platen carrier at opposite sides of the platen; and guide means for the stencil web at opposite sides of the platen, the platen being elevated above the plane of said guides.

2. In a machine for the purpose indicated, in combination with a fixed support, a punch carrier mounted thereon for rotation about a fixed axis; a platen carrier mounted for movement along said fixed support, and a platen on said carrier; a pair of rolls from and onto which respectively a stencil web may be wound mounted on the platen carrier at opposite sides of the platen; one of the rolls being mounted below the plane of the top surface of the platen carrier, and the punch-meeting surface of the platen being above said plane, whereby the corner of the platen carrier forms a guide for the stencil web.

3. In a machine for the purpose indicated, in combination with a fixed support, a punch carrier mounted thereon for rotation about a fixed axis; a platen carrier mounted for movement along said fixed support, and a platen on said carrier; a pair of rolls from and onto which respectively a stencil web may be wound mounted on the platen carrier at opposite sides of the platen, one of the rolls being mounted above the platen carrier, the punch-meeting surface of the platen being elevated above the top of the platen carrier, and a guide for the web between said roll and the platen, consisting of a rod mounted on the platen carrier upraised from its surface and below the plane of the punch-meeting surface of the platen.

4. In combination with a web-supporting platen, a punch carrier, a punch mounted thereon for reciprocation toward and from the platen; a hammer on the punch carrier for driving the punch against the platen; a spring handle for the hammer which yieldingly resists the retraction of the hammer from the punch and which reacts for driving it thereagainst, and a tripping means for retracting the hammer and releasing it.

5. In combination with a web-supporting platen, a punch carrier; a punch mounted thereon for reciprocation toward and from the platen; a hammer on the punch carrier for driving the punch against the platen; a spring which resists the retraction of the hammer from the punch and reacts for driving it there-against; a cam mounted for rotation having an abrupt axis-ward-extending shoulder along which the hammer arm trips off, said cam being adapted to retract the hammer by its rotation preceding arrival at the tripping point.

6. In the construction defined in the last claim foregoing, the rotatable cam comprising two diametrically-opposite eccentrics, each having its eccentric periphery terminating at an axis-ward-extending shoulder.

7. In combination with a web-supporting platen, a punch carrier; a punch mounted thereon for reciprocation toward and from the platen; a hammer on the punch carrier for driving the punch against the platen; a spring arm or handle for the hammer which normally positions the latter at a short distance away from the punch and is adapted to retract it to that position upon its displacement therefrom; a tripping means for retracting the hammer against the resistance of the spring and releasing it for actuation by said spring, and a friction spring device into frictional engagement with which the hammer is forced in the punch-actuating stroke, adapted to retard its recoil and limit its vibration back and forth through its normal rest position.

8. In combination with a platen and a punch coöperating therewith for cutting a stencil, a pair of rolls from and to which respectively a stencil web may be wound, said rolls positioned to cause the path of the web extending between them to cross the platen; means for holding the web against longitudinal movement at two places in its path between which said path crosses the platen; a platen carrier on which both the rolls are mounted, one of the rolls being on the opposite side of the carrier from the platen, whereby the web runs from said rolls over the edge of the carrier to reach the platen, one of the web-holding means being a clamp device for clamping the web on said edge of the platen carrier.

9. In combination with a platen carrier and a platen carried by it, a pair of rolls to and from which a web may be wound, said rolls being mounted on the platen carrier, positioned for causing the path of the web from roll to roll to cross the platen; a punch carrier overhanging said path and adapted to position the punches above the platen for coöperation therewith; a U-

shaped arm on which said punch is carried, said U-shaped arm being hinged at one side of the platen carrier below the level of the top surface thereof, and a step on which the other end of said U-shaped arm is lodged at the opposite side of the platen carrier.

10. In the construction defined in claim 9 foregoing, a vertically adjustable bracket which affords the pivot of said U-shaped arm at one side of the platen carrier, and the step at the other side being vertically adjustable.

11. In combination with a platen and a punch coöperating therewith for cutting a stencil, a carrier for the punch mounted for positioning the punch at a predetermined operating position; means for moving a stencil in one direction across the platen; step-feeding means for moving the platen and the web-moving means in a transverse direction, and pedal-operated connections for operating the step-feed means.

12. In the construction defined in claim 10, a main support upon which the punch carrier is mounted, a carrier for the platen and for the stencil-carrying and moving means also mounted on said main support; a ratchet-toothed bar attached to said last-mentioned carrier; a spring-actuated pawl for engaging the said ratchet bar, and lever connections by which said pawl is operated for giving a step-feed movement to said last mentioned carrier.

13. In combination with a coöperating platen and punch, a carrier for the platen; a main support on which the punch is supported for operating at the determined position and on which the platen carrier is movable; a gage plate mounted on the main support having a row of gage holes extending longitudinally of the direction of movability of the platen carrier, and a stop which is adapted to be inserted into any one of said gage holes and to protrude therefrom for stopping the adjustment of the platen carriers.

14. In the construction set out in claim 13 foregoing, the gage plate being adjustable longitudinally upon said main support.

In testimony whereof, I have hereunto set my hand at De Kalb, Illinois, this 21st day of July, 1919.

ERNEST G. CLARK.