

(No Model.)

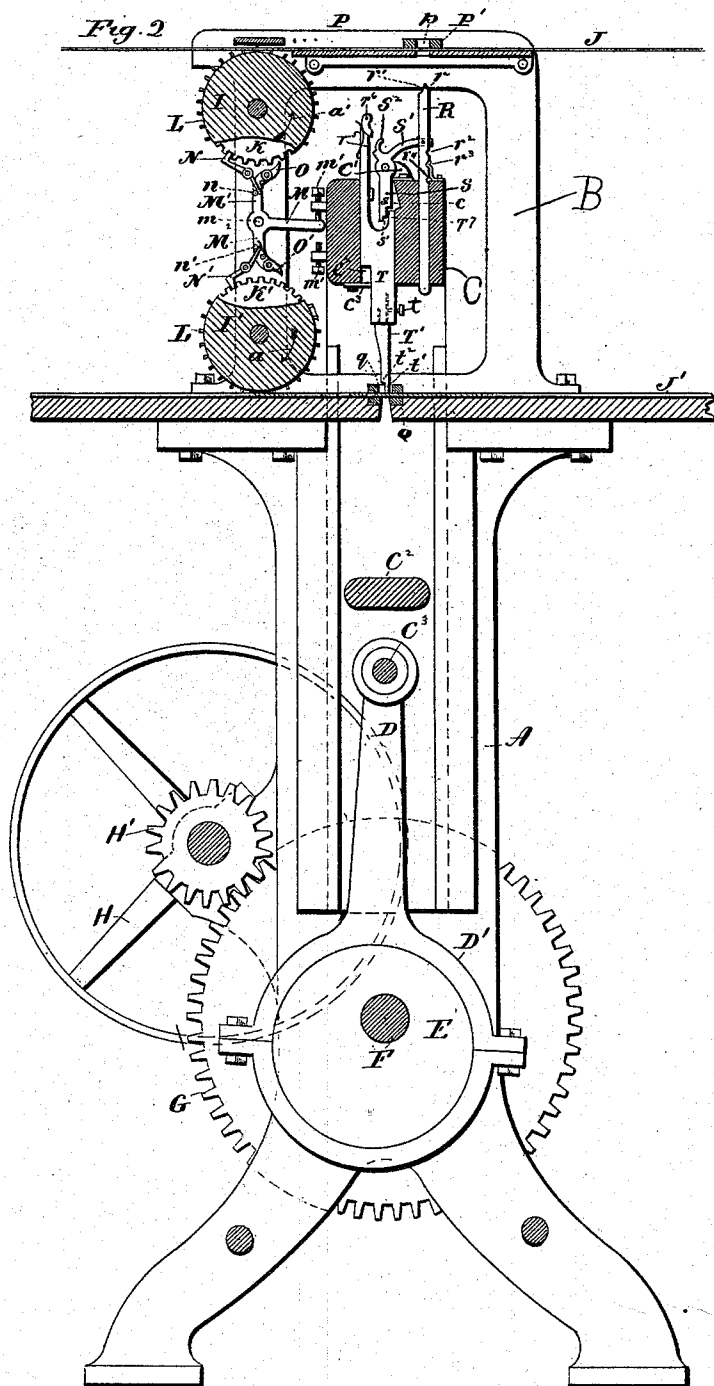
3 Sheets—Sheet 1.

W. E. GRIGGS.

MACHINE FOR MAKING PERFORATED SHEET MUSIC.

No. 527,970.

Patented Oct. 23, 1894.



Witnesses,
J. H. Shumway
Lillian D. Kellogg

Wilfred E. Griggs
Inventor
By Atty Earle Seymour

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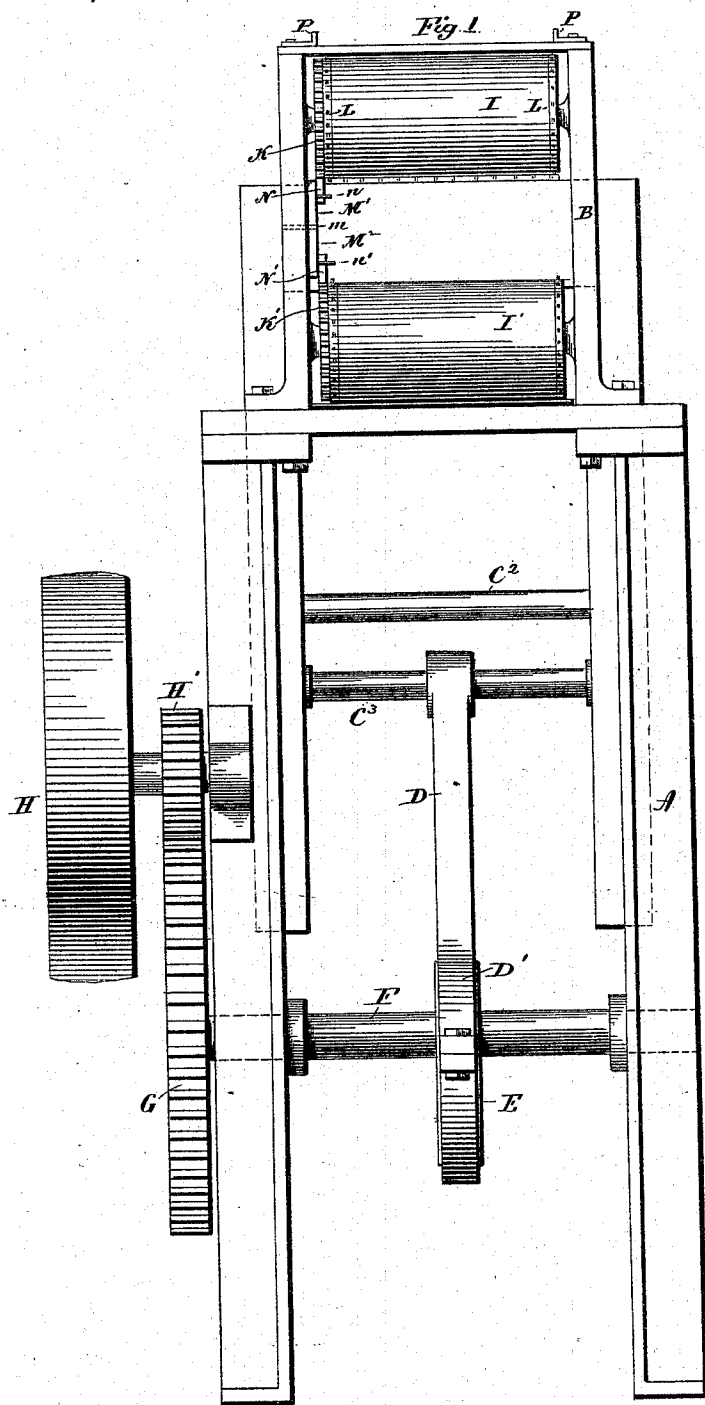
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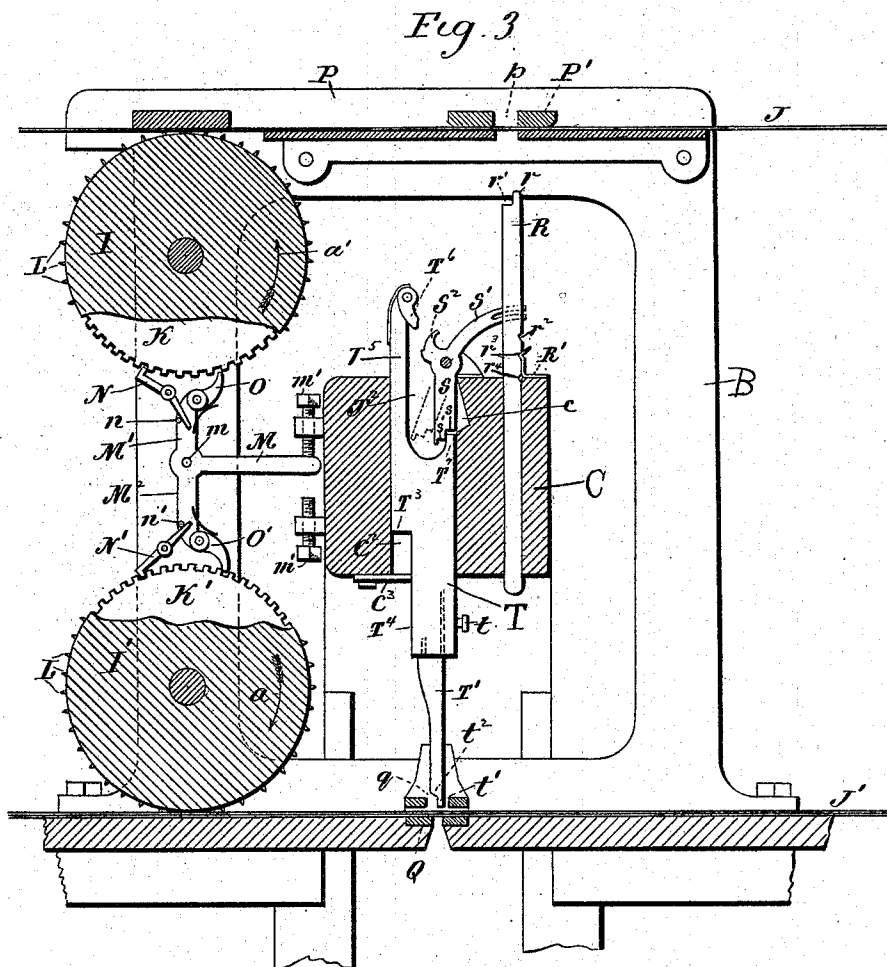
3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

WILFRED E. GRIGGS, OF WATERBURY, CONNECTICUT.

MACHINE FOR MAKING PERFORATED SHEET-MUSIC.

SPECIFICATION forming part of Letters Patent No. 527,970, dated October 23, 1894.

Application filed November 24, 1893. Serial No. 491,863. (No model.)

To all whom it may concern:

Be it known that I, WILFRED E. GRIGGS, of Waterbury, in the county of New Haven and State of Connecticut, have invented a new Improvement in Machines for Making Perforated Sheet-Music; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in front elevation of a machine constructed in accordance with my invention; Fig. 2, a view thereof in vertical longitudinal section; Fig. 3, an enlarged sectional view through the frame of the machine showing the feeding mechanism and one of the punching mechanisms.

My invention relates to an improvement in machines for making perforated sheet-music, which is designed to be used in mechanical musical instruments of the orguinet type, the object being to produce a simple, convenient and effective machine, having a large capacity for work, not liable to derangement, and producing perforated music sheets of superior finish, and requiring no subsequent trimming after leaving the machine.

With these ends in view, my invention consists in certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

As herein shown, my improvement is applied to a punch-press of ordinary construction, and having a standard A, a frame B, bolted to the upper end thereof, a cross-head C, which reciprocates in the said frame, two parallel upright guides C' C' attached at their upper ends to the opposite ends of the cross-head, mounted in the standard A, so as to play up and down therein, and connected by a cross-beam C², a pitman D, attached at its upper end to a cross-bar C³, extending between the said guides, and terminating at its lower end in eccentric-strap D', an eccentric E, encircled by the said strap, a driving-shaft F on which the eccentric is mounted, a main-wheel G, also mounted on said shaft, and a driving-pulley H, carrying a pinion H', meshing into the said wheel. The parts above described are, with the exception of the cross-

head C, of ordinary construction, and do not need detailed description.

In the forward end of the frame I mount two horizontal feed-rolls I and I', located one above the other, and made a little longer in length than the width of either the pattern or stencil-strip J, and the music-strip J'. The upper feed-roll is provided at one end with a feed-wheel K, and the lower roll I' with a feed-wheel K', having a corresponding number of teeth, and each roll is furnished at each end with a circular series of feed pins L, arranged as clearly shown in Fig. 2 of the drawings, the rows of pins on the ends of the rolls next to the feed-wheels being located very near to the inner faces thereof. The said rolls are rotated alternately in opposite directions, by means of an operating lever, having a horizontal arm M, and two vertical arms M' and M², corresponding to each other, but extending in opposite directions from the outer end of the arm M, the said lever being hung on a pin m, mounted in an upright of the frame B. The arm M aforesaid extends inward between two adjustable screws m' m' located opposite each other in the same vertical plane, and carried by the adjacent face of the cross-head C, and alternately striking the arm M as the head is reciprocated, so as to turn the lever on its pin m.

A detent N, pivoted to the frame B, is adapted at its outer end to coact with the teeth of the feed-wheel K of the upper feed-roll I, and at its inner or tail end to coact with a pin n, carried by the upper arm M' of the lever. A corresponding detent N', pivoted to the frame, is constructed at its outer end to coact with the feed-wheel K' of the lower feed-roll I', and at its inner or tail end to coact with a pin n' mounted in the arm M² of the lever. The upper arm M' of the lever is furnished with a spring-actuated operating-pawl O, arranged to engage with the teeth of the upper feed-wheel K, to advance the feed-roll I, while the arm M² of the lever is provided with a corresponding spring-actuated operating pawl O', arranged to engage with the teeth of the lower feed-wheel K to advance the lower feed-roll I'.

Under the described construction, the upstroke of the head C causes the lower screw m' to strike the horizontal arm M of the op-

erating lever, whereby the pin n' acts upon the tail of the detent N' to disengage the same from the teeth of the feed-wheel K' , and to cause the operating-pawl O' to engage with the teeth of the said wheel, and advance the roll one step in the direction of the arrow a , whereby the music-strip J' is fed forward. The same movement of the operating-lever will cause the operating pawl O to be drawn back over one tooth of the feed-wheel K , but will not affect the position of the detent N . On the other hand, when the head makes its down stroke, the upper screw m' will strike the inner end of the arm M of the operating-lever, and turn the same so as to effect, through the pin n , the disengagement of the detent N from the feed-wheel K , and the engagement of the operating-pawl O with the teeth of the said wheel, which it will advance one step in the direction of the arrow a' , whereby the stencil strip J will be fed forward. At the same time the pawl O' will be drawn back over one tooth of the feed-wheel K' in position to rotate the same in the opposite direction at the next upstroke of the head. It will thus be seen that the upstroke of the head causes the lower feed-roll to be rotated and the music-strip to be fed forward and vice versa.

I do not limit myself to employing the feeding mechanism just above described, for I may replace it by other devices designed to do the same work, but its simplicity makes its use desirable.

For the purpose of guiding the pattern-strip J , I employ two side guides P P fastened to the top of the frame B . Between these guides I locate a platen P' arranged transversely to them and to the length of the strip, and constructed with a longitudinal series of small openings p , one of which is shown.

The music-sheet J' is prevented from lateral displacement by the frame B between the uprights of which it passes, and moves through a die Q , which also has the function of a guide, and which is constructed with a longitudinal series of openings q .

The perforation of the music-strip J' in exact accordance with the perforations in the pattern-strip J , is effected by a series of corresponding punching mechanisms mounted in the cross-head C , and co-operating with the platen P' and the die Q before mentioned. The number of these mechanisms will correspond to the number of rows of perforations in the music-strip to be produced. Inasmuch, however, as they correspond to each other, all of them will be illustrated and described by the illustration and description of one. Each of the said mechanisms, then, comprises a vertically movable rod or feeler R , a locking dog S , a punch-head T , and a punch T' adjustably attached to the lower end of the punch-head. The said feeler, which is mounted in the cross-head C so as to slide freely up and down therein, is constructed at

its extreme upper end with a finger r , and a shoulder r' , and has three notches r^2 r^3 and r^4 formed midway of its length in its rear edge, the said notches being engaged by a spring R' secured to the upper face of the cross-head C . It may be well to explain here that the feeler is so named by me because it virtually feels for the holes in the pattern-strip. The said locking dog S , which couples the feeler and the punch-head and hence the punch, is pivotally hung from a bracket C' attached to the upper face of the head, and enters a wide notch T^2 formed in the upper end of the punch-head T . It is constructed with a coupling-arm S' , by means of which it is pivotally connected with the feeler R , and with a notched operating-arm S^2 , extending in the opposite direction, and shorter. At its lower end it has an inner shoulder s and an outer shoulder s' . The said punch-head T is located in an opening C^2 , formed in the cross-head to receive it, and is free to play up and down therein within narrow limits, its downward movement being limited by means of a retaining plate C^3 , applied to the lower face of the cross-head C , and engaging with a shoulder T^3 , formed at the lower end of the punch-head by cutting the same away, as at T^4 . At its upper end the punch-head is constructed with an arm T^5 , carrying a spring-actuated pawl T^6 , extending inward in position to co-operate with the operating-arm S^2 of the locking-dog S . On the opposite side of the notch, formed in the upper end of the punch-head, from the arm T^5 , I form an operating-finger T^7 , which coacts with the inner and outer shoulders s and s' of the locking-dog, as will be described later on. The said punch T' is adjustably secured in the lower end of the punch-head by means of a screw t , and is constructed at its lower end with a punching finger t' , corresponding in cross section to the shape of the short perforations to be made in the music-strip J' , and with a trimmer t^2 , corresponding in width to the said finger and located above and in the rear of the finger t' , and is in fact a beveled cutting edge. The function of this trimmer is to cut away the webs or thin partitions left between the contiguous openings formed by the cutting finger of the punch in the formation of the long openings, by which term I mean to cover all openings of whatever length longer than the smallest or shortest openings formed in the music-strip, for such long openings are formed by locating two or more short openings close together, and successively cutting away the little webs between them. My improved machine might be timed so close that no webs would be formed in punching the strip, in which case the trimmer would not be required. I prefer, however, to employ it as it insures the production of perfectly finished music-sheets, and also avoids the necessity of timing the machine as close as would be necessary if no trimmer were provided.

Having now described my improved ma-

chine, I will proceed to set forth the method of its operation.

It is to be understood, in the first place, that the stencil or pattern-sheet contains rows of short and long openings or perforations, which alternate with each other, according to the character of the music. The short perforations, as I use that term, are all of the same length, while the long perforations vary greatly in length. It will be understood also, that the cross-head of the machine contains as many punching mechanisms as there are rows of openings in the pattern-strip. The said pattern-strip has each of its edges constructed with perforations, spaced in conformity with the spacing of the feed-pins on the upper feed-roll, and is produced by hand, or made with the aid of an original pattern-sheet produced by hand. Its forward end is passed under the platen P' and engaged with the teeth of the upper feed-roll. The blank music-strip has its forward end passed through the die, and engaged with the feed-pins of the lower feed-roll, which is thereto manually rotated sufficiently to make a few punctures in the strip, for the music-strip is not punctured along its edges prior to being fed into the machine, but is designed to be punctured by the machine as it is drawn thereinto. The machine therefore forms those perforations in the music-strip by means of which the same is fed. The pattern-strip and blank music-strip having been introduced into the machine, let it be assumed that the parts of one punching mechanism are in the positions in which they are shown by Figs. 2 and 3 of the drawings, wherein the feeler is represented as being supported in its intermediate position by the engagement of the spring R' with its middle notch r^3 , and wherein the locking dog is represented in its intermediate position, in which its inner shoulder s , is represented as being in line with the operating-finger T^7 of the punch-head. Now if on the next upstroke of the cross-head C , the feeler strikes an imperforate place in the pattern-strip, it will be depressed, and the spring R' jumped into its top notch r^2 . This movement of the feeler acting through the coupling-arm S' of the locking dog S , throws the same into its retired position. Indicated by broken lines in Fig. 3 of the drawings. When the cross-head makes its down stroke, the punch instead of being forced through the music-strip J' , will simply ride on the same, and the cross-head C , will complete its down stroke without carrying the punch-head and punch with it, for the dog being retired, does not engage with the operating-finger T^7 of the punch-head, but moves downward in the notch T^2 , out of the range of the said finger. In the succeeding upward movement of the cross-head, the pawl T^6 engages with the operating-arm S^2 of the dog, and swings the same outward into what I shall call its highest position, for in this position of the dog its outer shoulder s' is brought into line with the operating finger T^7 of the punch-

head, the body of the dog being swung into the recess c offsetting from the opening c^2 formed in the head C . As the dog is swung from its retired into its highest position, the feeler is lifted two notches, the spring R' being therefore jumped into its lower notch r^4 .

The operation above described will be repeated over and over as long as the feeler strikes an imperforate place in the pattern-strip on the upstroke of the cross-head; but if the feeler strikes an opening, long or short, its finger will pass into the same, if a short opening, and into its inner end if a long opening, and the feeler will be depressed one notch, and the spring jumped from the upper notch r^2 to the middle notch r^3 . This movement of the feeler will swing the locking dog into its intermediate position, in which it is shown by Fig. 3 of the drawings in full lines. Now on the next down stroke of the cross-head, the cutting finger at the lower end of the punch will pass through the music-strip, and form a short opening, but the trimmer t^2 will not yet be brought into operation. On the upstroke of the cross-head the pawl T^6 will engage with the operating finger S^2 of the locking-dog, and again throw the same into its highest position, in which its outer shoulder s' will be aligned with the operating-finger T^7 of the punch-head. This movement of the dog lifts the feeler one notch, jumping the spring from the middle-notch r^3 into the lower notch r^4 . Then if on this same upstroke of the cross-head, the feeler strikes an imperforate place in the pattern-strip, it will be depressed two notches, and the dog retired, so that on the next down stroke the punch will simply ride on the paper, and this is what will occur if two or more short openings are formed in succession, for there is always the length of an opening or an imperforate place between every two of the short openings, and between every short opening and a long opening. If, however, on this same upstroke of the cross-head, a long opening in the pattern strip is presented to the feeler, the same will pass up through it, and the dog will be left in its highest position, so that on the next down stroke of the cross-head the punch will be forced down so as to bring the trimmer into play to cut away the little web or partition formed between the opening just made and the opening which was made in the last previous descent of the punch. On the next upstroke of the cross-head, the dog will not be acted upon by the pawl, but will be left in its highest position, and it will stay there and continue to operate the cutting finger of the punch and the trimmer thereof, as long as the feeler passes clear through the pattern.

The various readjustments above described will be reproduced in indefinite order, according to the character of the openings.

In the foregoing description of the operation of my improved machine, I have spoken only of one music-strip and only one has been

shown in the drawings, but it will be understood that in using the machine several strips are laid one upon the other, and cut by the punches and perforated by the feed pins at the same time.

My improved device is very simple in construction, and not liable to derangement, and not only takes a perfectly plain blank music-strip and perforates the same for feeding, but also trims the same, so that when it leaves the machine it is done and ready for use.

I would have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention. I am aware, however, that it is not new in machines for making perforated sheet-music to connect the feed-rolls of the pattern and music strips with the punching mechanism for operating the said rolls in unison with each other and also in unison with the said mechanism.

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

1. In a machine for making perforated sheet-music, the combination with devices for feeding the pattern-strip and the music-strip, of a punching mechanism, including a punch constructed with a cutting-finger and a trimmer corresponding in width to the said finger and located directly above and in rear of the same for trimming the webs between the openings formed by the edge, substantially as described.

2. In a machine for making perforated sheet-music, the combination with a punching mechanism including a punch, a feeler and connection between the same; of two feed rolls located one above the other, for feeding the pattern and music strips respectively, and mechanism operated by the punching mechanism for rotating the feed-rolls step by step in opposite directions alternately, and including a three-armed lever located between the said rolls and having an arm for co-operation with each of the rolls and with the punching mechanism which oscillates the lever and actuates the rolls, substantially as described.

3. In a machine for making perforated sheet-music, the combination with a punching mechanism including a reciprocating cross-head, of two feed-rolls for feeding the pattern and the music-strip, each roll being provided

at one end with a feed-wheel, and at each end with a row of feed-pins, of an operating lever having an operating-arm which is alternately moved up and down by the cross-head of the punching mechanism, and two arms extending respectively toward the feed-rolls, each of the arms last mentioned being furnished with a spring-actuated operating-pawl, and two detents respectively engaged with the said feed-wheels, and the said arms last mentioned, which disengage them from the feed-wheels for the rotation of the feed-rolls, substantially as described.

4. In a machine for making perforated sheet-music, the combination with feeding mechanism for feeding the pattern and the music-strip, of a punching mechanism including a head, means for reciprocating the same, a feeler mounted in the head and arranged to impinge against the pattern-strip, and to pass into and through the openings thereof, a pivotal locking-dog carried by the said head and connected with the feeler, and constructed at its lower end with an inner and outer shoulder, a punch-head mounted in the reciprocating head so as to slide up and down therein, and constructed to be operated upon by the inner and outer shoulders of the locking-dog, a pawl carried by the punch-head, and coacting with the locking-dog to swing the same into position for operation, a punch mounted in the said punch-head, and having a cutter and a trimmer and a die receiving the said punch and the music-strip, substantially as described.

5. In a machine for making perforated sheet-music, the combination with devices for feeding the pattern-strip and the music-strip, of a punching mechanism including a punch mounted in a cross-head so as to be vertically movable therein, and adapted to punch the music-strip, a feeler mounted in the said cross-head, and adapted to be vertically moved therein independent of the punch, and to coact with the pattern-strip, and means also carried by the cross-head for connecting the punch and feeler, whereby one is caused to act upon the other, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILFRED E. GRIGGS.

Witnesses:

FRED. C. EARLE,

LILLIAN D. KELSEY.