(Model.)

4 Sheets—Sheet 1.

R. T. SMITH.

Paper Perforating Machine.

No. 233,882. Patented Nov. 2, 1880.

Fig. 7.

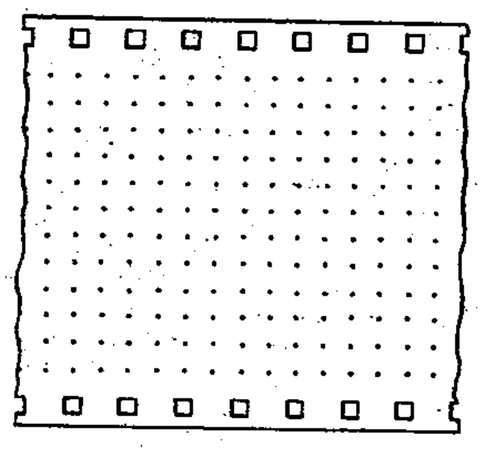


Fig. 4.

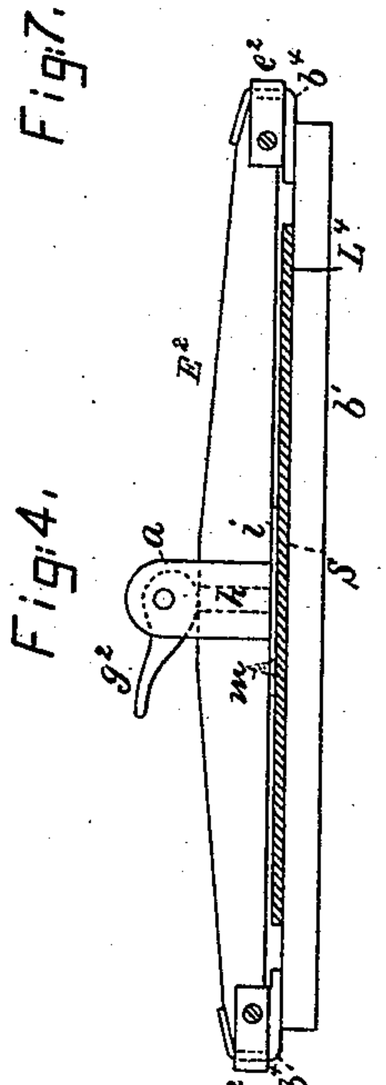
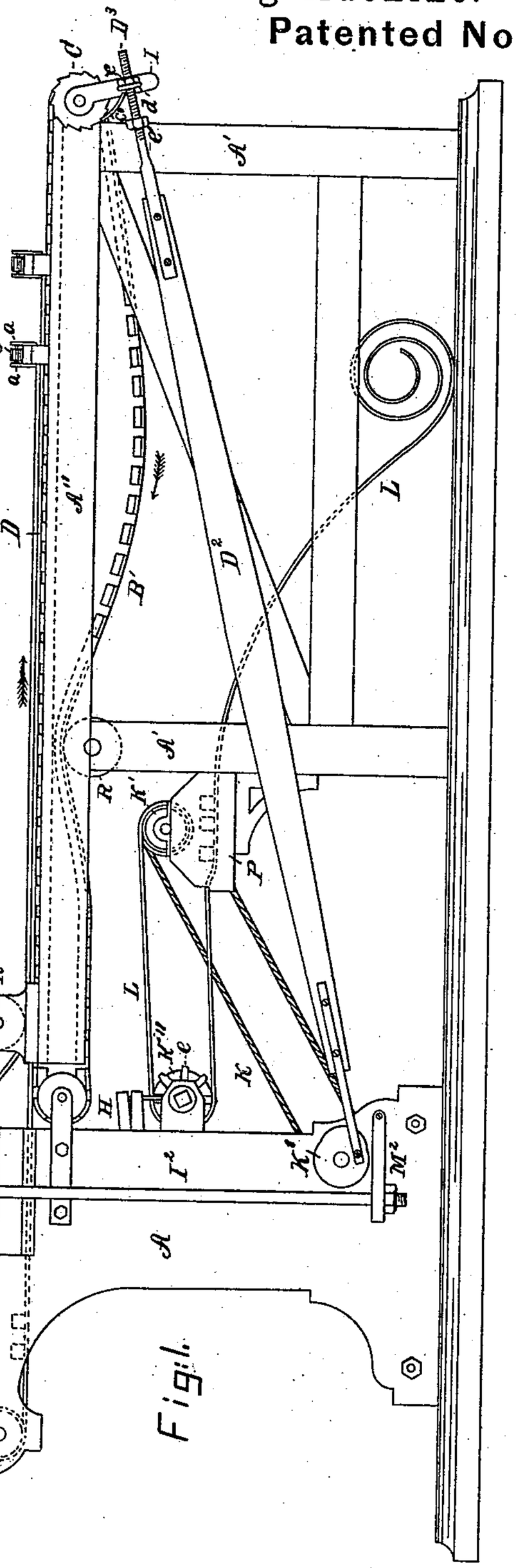


Fig. 1.



Witnesses.

C. C. Perkins.

L. L. Tilden

Inventor.

Roswell T. Smith,

By Charles B. Tilden

Attorney.

(Model.) 4 Sheets—Sheet 2.

R. T. SMITH.

Paper Perforating Machine.

No. 233,882. **Patented Nov. 2, 1880.**

Fig. 2.

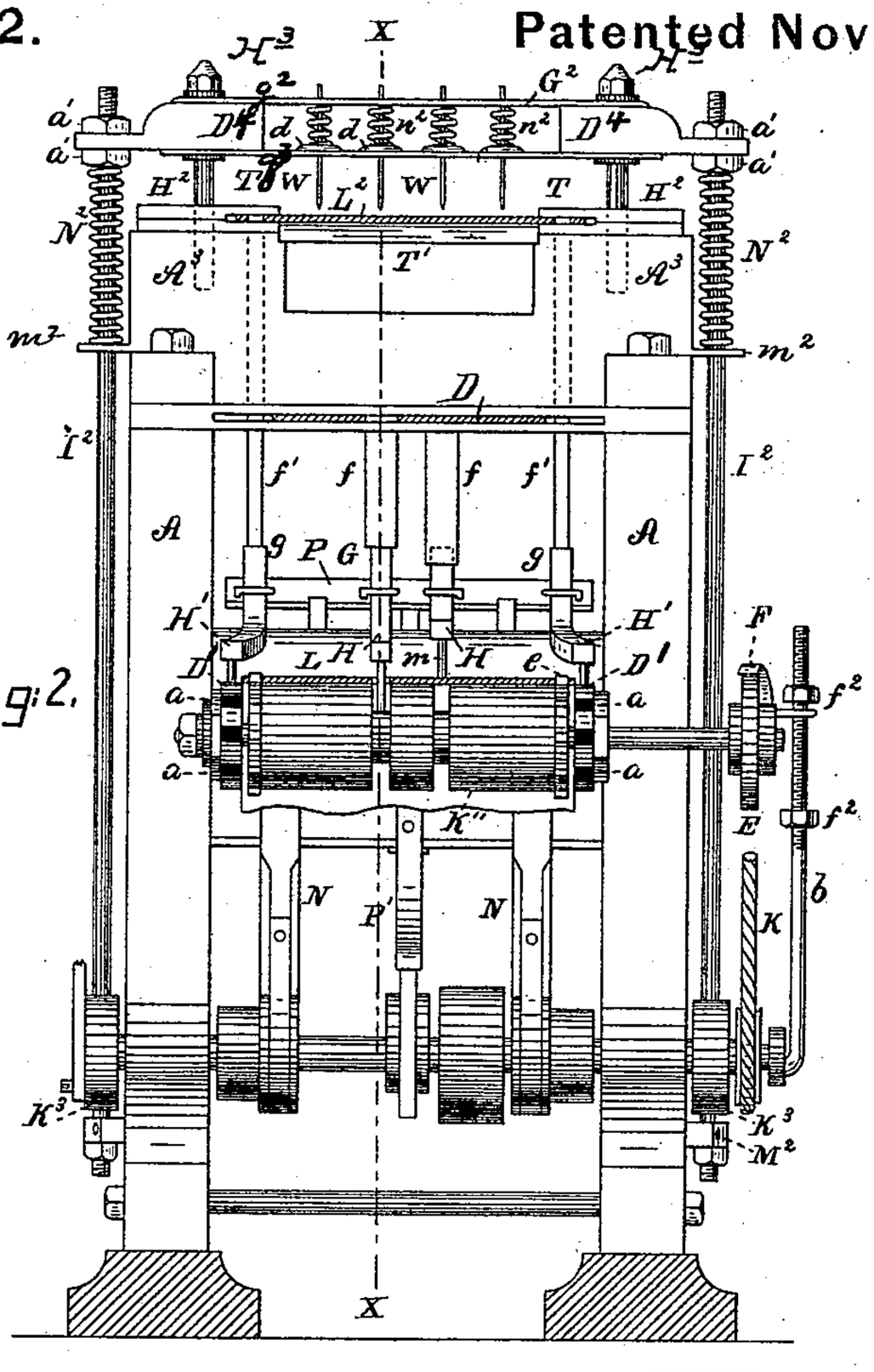
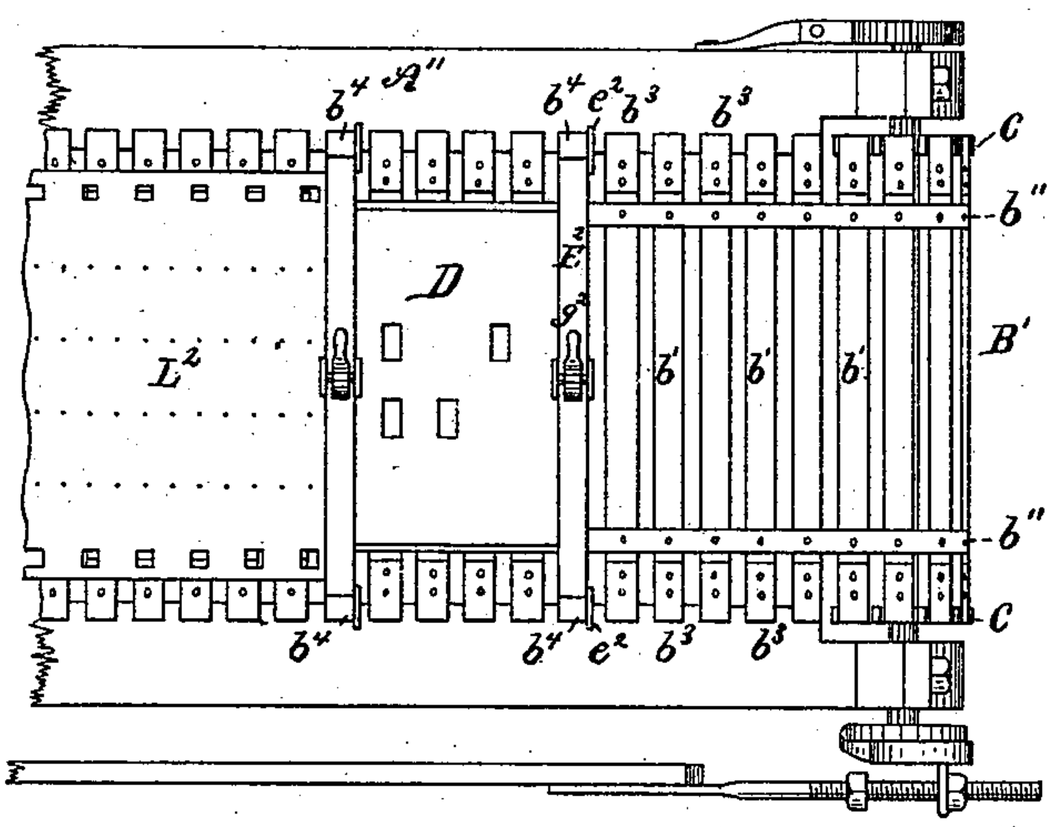


Fig. 3.



Witnesses.

C. C. Perkins.

L. L. Tilden

Inventor.

Roswell T. Smith

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Attorney.

(Model.) 4 Sheets—Sheet 3.

R. T. SMITH.

Paper Perforating Machine.

No. 233,882. **Patented Nov. 2, 1880.**

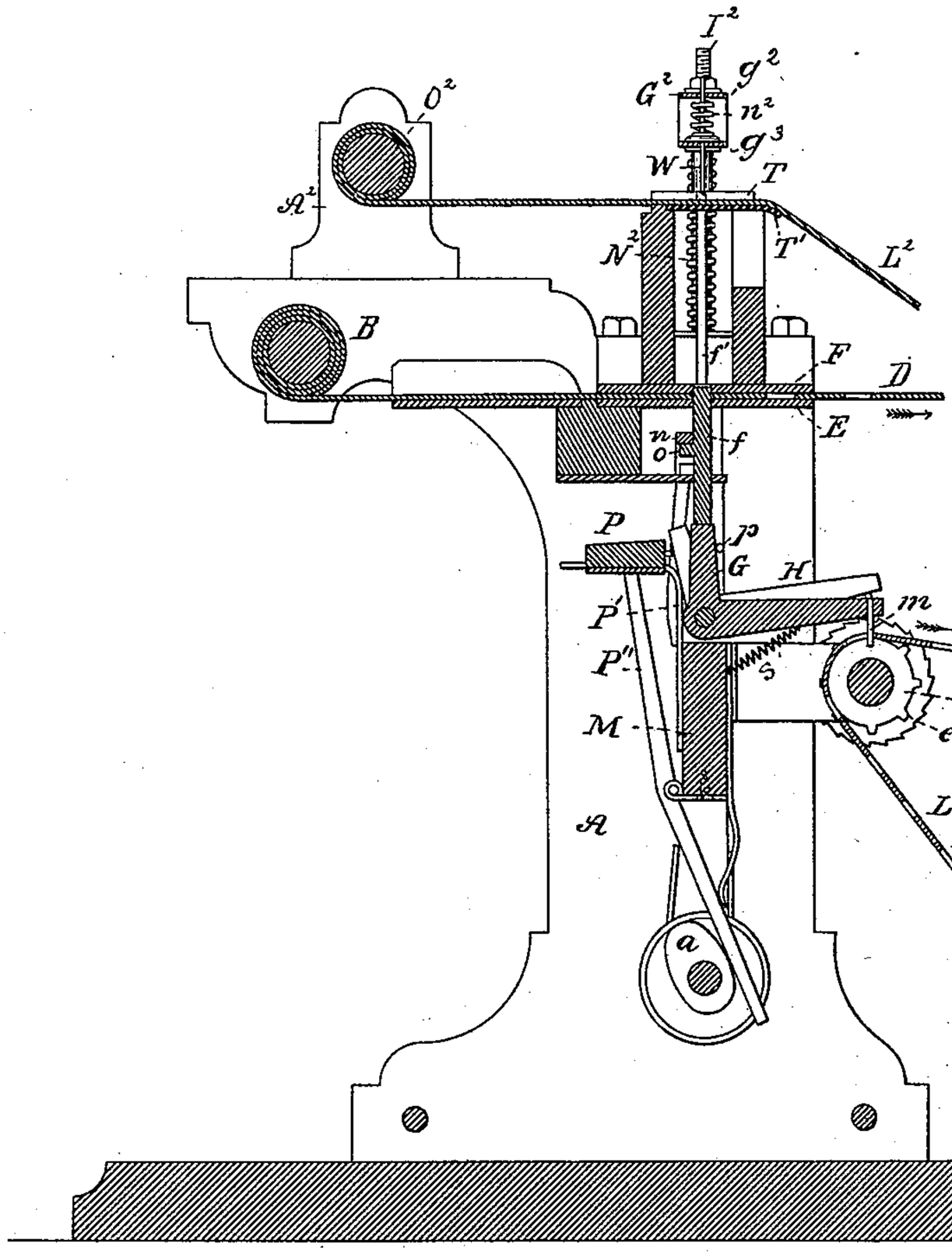

Fig. 5.

Witnesses.

E. C. Perkins.

W. C. Tilden

Inventor.

Roswell T. Smith,

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Attorney.

(Model.) 4 Sheets—Sheet 4.

R. T. SMITH.

Paper Perforating Machine.

No. 233,882. Patented Nov. 2, 1880.

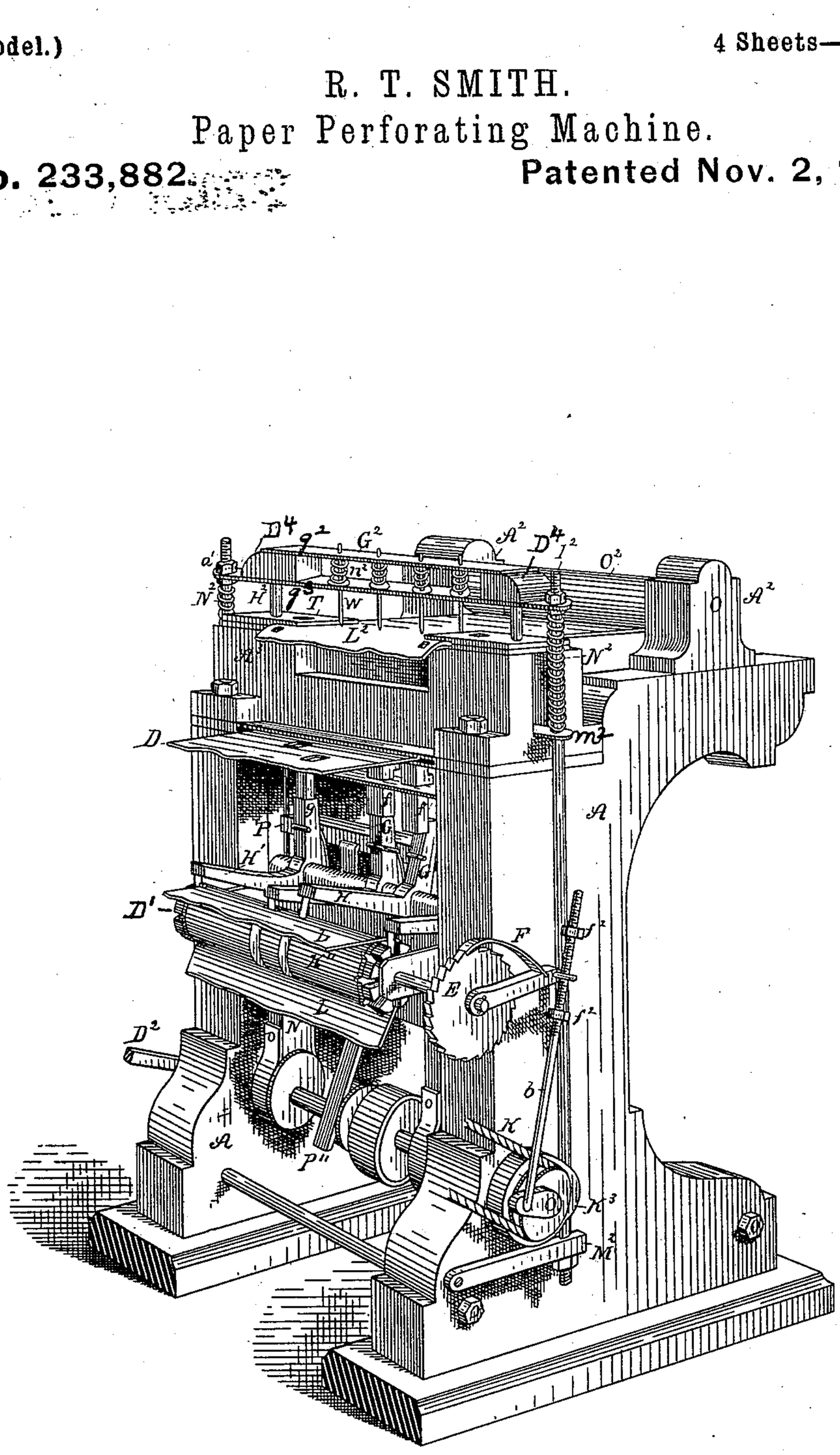

Fig. 6.

Witnesses.
E. C. Perkins.
W. C. Tilden

Inventor.
Roswell T. Smith,
By Charles B. Tilden
Attorney.

UNITED STATES PATENT OFFICE.

ROSWELL T. SMITH, OF NASHUA, NEW HAMPSHIRE.

PAPER-PERFORATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 233,882, dated November 2, 1880.

Application filed March 1, 1880. (Model.)

To all whom it may concern:

Be it known that I, ROSWELL T. SMITH, of Nashua, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Machines for Perforating Paper for Automatic Organs, of which the following is a specification.

My invention relates to that class of perforating-machines for which Letters Patent of the United States were granted to me upon the 27th day of January, A. D. 1880, numbered 223,866; and it consists in certain improvements upon the mechanism therein shown and described.

Referring to the drawings forming part of this specifiation, Figure 1 is a side elevation. Fig. 2 is a vertical cross-section taken upon the line *x x*, Fig. 1. Fig. 3 is a plan, showing a portion of the frame for supporting the feeding mechanism. Fig. 4 is a view, upon an enlarged scale, of the clamp-bar used in connection with the feeding-belt. Fig. 5 is a section taken in a plane passing vertically through the perforating mechanism from front to rear at a point about midway between the standards. Fig. 6 is a perspective view, showing the perforating mechanism, the feeding mechanism and its supporting-frame being removed. Fig. 7 is a view of a portion of the stencil-sheet blank before it is perforated for use.

In my patent of January 27, 1880, I have shown and described certain mechanism for feeding the paper sheets to the perforating-punches. As therein shown, said mechanism consists, substantially, of two rolls, between which the paper passes, said rolls being tightly pressed together. By the friction or gripe of these rolls upon the paper it is drawn, step by step, above the perforating-punches, the revolution of the rolls being effected by means of a pitman on the main shaft, by which intermittent motion is given to a pawl-carrier vibrating upon the shaft of one of the feed-rolls. A pawl mounted upon this carrier is adapted to engage with a ratchet rigidly mounted on the shaft of the roll, and the throw of this pawl is regulated by nuts, which may be adjusted upon a threaded portion of the pitman, in the manner fully set forth in the specification of my said patent. I have stated in that specification that the utmost accuracy is necessary in the construction and combination of these parts, as it is absolutely essential to secure the highest degree of precision in the step-by-step movement or feed imparted to the paper sheet. In the movement or feed of the stencil or pattern sheet a similar precision is equally necessary. In order, therefore, to obtain a more accurate feed-movement of the paper sheet and stencil, I have invented a feeding apparatus consisting of an extended frame supporting a flexible belt passing over rolls at each end, said belt being provided with a detachable clamp, whereby the paper, or the paper and stencil together, may be attached to the surface of the belt at any point, an intermittent or step-by-step motion being given to the belt, whereby the paper is drawn through the machine and submitted to the action of the punches. This constitutes the first part of my invention.

In my said patent of January 27, 1880, I have also shown and described certain mechanism for imparting a feed-movement to the stencil or pattern sheet. This, as shown, is accomplished by the revolution of the stencil-roll, over which the pattern-sheet passes, and with which it engages by teeth or cogs placed at or near the ends of said roll and engaging with a rack or series of perforations formed near each edge of the stencil-sheet. It is obvious that great care must be taken in forming this rack in order that each one of the series of perforations shall register with the corresponding tooth on the stencil-roll, as the least irregularity would either displace the sheet or cause it to slip on the roll, causing thereby a corresponding error in the arrangement of the perforations cut in the paper sheet. I have therefore invented and incorporated with my perforating-machine mechanism for automatically cutting the rack in a blank stencil-sheet, the arrangement being such that the blank stencil-sheet is fed to the rack-cutting punches by the same mechanism which at the same time is feeding the paper sheet to the perforators. The rack is cut by suitable punches arranged and operated in the manner hereinafter described specifically. This rack-cutting mechanism forms the second part of my invention.

In the process of preparing a stencil-sheet

it is necessary to divide its surface into equal parts or spaces before it passes into the hands of the composer, who lays off upon the surface the various sound openings or perforations, designating their relative position and length by suitable marks upon the sheet, the openings being afterward cut by a mallet and punch. In order to enable him to correctly arrange these openings with relation to each other, as well as to fix the length of each cutting, it has heretofore been customary to draw a series of transverse lines upon the surface of the sheet, separated by equal intervals and exactly parallel with each other. This work has always required the utmost care, since the harmony of the music and the entire execution depend upon the accuracy with which the sound-openings are arranged and cut. Heretofore this ruling of the stencil-sheet has been done by hand. It is found, however, that the constant repetition of the parallel lines has a tendency to confuse the eye of the operator and cause inaccuracy, even with the utmost care. Moreover, hand-labor of this kind is so slow and requires such attention that it adds largely to the cost of producing the music-paper. I have therefore invented and incorporated with the perforating and rack-cutting mechanism an apparatus for automatically marking the surface of the blank stencil-sheet with as many series of dots or points as there are different series or rows of cuttings or perforations to be formed therein. This is accomplished by a number of pencils or marking-points set in a reciprocating frame and brought after each feed-movement into contact with the stencil. When finished, the surface of the sheet will show a number of dots arranged in exactly parallel lines, both longitudinally and transversely, with equal intervals between. Each longitudinal row of these dots is located exactly in the line of a row of the perforations, and the interval between any two of the marked points or dots is equal to the space cut out by a single stroke of the perforating-punch, or, in other words, to the length of the shortest note or sound-opening used. This marking apparatus, which is combined with the rack-cutting mechanism, constitutes the third part of my invention.

In order to convey a clear idea of the improvements which constitute my present invention, and to aid in distinguishing them from the patent granted to me January 27, 1880, I will briefly set forth the principal features of the machine shown and described in said patent, and will then point out more definitely the parts which belong to my present invention.

My said patent shows a machine for perforating the music-paper for automatic organs, in which a series of independent punches, *f*, (see Fig. 5 of the accompanying drawings,) are used to cut the sheet D, which is fed between a die and stripper-plate directly above the punches. An automatic selection of these punches is effected by means of dogs G, controlled by a corresponding series of arms, H, having pins *m*, which engage with the stencil L as it passes over a grooved stencil-roll, K″, the dogs G being brought under and into engagement with their punches when the pins *m* drop through perforations in the stencil, and, on the other hand, being held out of engagement with the punches as long as the pins *m* rest upon the unperforated portions of the stencil L. The dogs G are mounted upon a reciprocating carrier-frame, M, which is driven upward between the feed-movements of the stencil and the paper-sheet. By this upward movement all those dogs which are in engagement with any of the punches *f* operate said punches by driving them up through the paper, while the other punches, not engaged by the dogs, remain idle. After each stroke the dogs G are all withdrawn from beneath the punches and the arms H raised by means of a yoke attached to a yoke-carrier, P, which is mounted by a spring, P′, upon the carrier-frame M. A pivoted lever, P″, actuated by a cam, *a*, on the main shaft, throws the yoke-carrier P backward as soon as the carrier-frame M descends, thereby causing the yoke *p* to retract all the dogs G, thereby raising all the arms H and lifting the pins *m* clear of the stencil until the latter has been fed a single step forward. As soon as this feed-movement is completed the cam *a* leaves the lever P″ and the spring P′ throws the yoke *p* forward, allowing the arms H to drop and bring their pins *m* into engagement with the stencil, thereby effecting a new selection of the perforating-punches. The arms H are drawn downward by either spiral springs *s* beneath the said arms or by light leaf-springs secured to the carrier-frame M and bearing against the rear edges of the pivoted dogs G. The punches *f*, after each stroke, are drawn downward by a yoke, *n*, which strikes against a tooth, *o*, upon the back of each punch. This yoke *n* is attached to the carrier-frame M, and the descent of said carrier after each stroke draws all the punches down and clears them from the paper sheet in time to permit its being fed one step forward.

My said patent of January 27, 1880, also describes certain mechanism for imparting intermittent rotary motion to the stencil-roll and to the feed rolls for moving the paper; but this portion of the said machine requires no specific mention, as it forms no part of my present invention.

I will first proceed to describe that portion of my present invention by which a rack is cut in the stencil-sheet and its surface is marked to prepare it for the composer.

Above the die and stripper-plates E F, between which the paper sheets pass, I place a support for a second stripper-plate, T′, extending from side to side of the machine, and having two die-plates, T, one at each side, as seen in Fig. 2 and in sectional view in Fig. 5. In the same series of perforating-punches *f*, I place two rack-cutting punches, *f′*, one being

placed at one end and the other at the opposite end of the line of paper-cutting punches *f*. These rack-cutting punches *f'* are in all respects similar to the perforating-punches, except in size and length, being about twice as long and somewhat smaller, to correspond exactly with the size and shape of the teeth *e* upon the ends of the stencil-roll K''. Upon the back of each punch *f'* is formed a tooth similar to the tooth *o*, (seen in Fig. 5,) and adapted to engage with the yoke *n* in the same manner.

Upon each end of the carrier-frame M is mounted a dog, *g*, directly beneath the rack-cutter *f'*, which is placed at that end of the line of punches. These dogs *g* are similar to the dogs G, which operate the paper-cutting punches, and are provided with arms H', the ends of which are slightly bent or curved outward, as seen in Fig. 2, their extremities being provided with pins similar to the pins *m* on the arms H. Upon each end of the stencil-roll K'' is a disk, D', having notches or cavities *a a* formed in its periphery. These notches are located at equal distances from each other, and, as may be seen in Figs. 2 and 6, they are placed exactly opposite to the teeth *e* on the ends of the stencil-roll.

By curving the arms H' outward the pins upon their extremities are brought directly over the notched disks D', and it is evident that as the stencil-roll K'' revolves these pins will fall at regular intervals into the notches in said disks, and will thereby cause the dogs *g* to engage with the rack-cutting punches *f'* and operate said punches.

The blank stencil-sheet L^2 is fed over the bed-plate T', its two edges passing under the die-plates T T. It may be taken from a roll, O^2, mounted in standards A^2, which, for the sake of convenience, I place nearly over the roll B, from which the paper is taken.

It will be noted by reference to Fig. 2 that the edges of the blank stencil-sheet pass beneath the die-plates T T, while nearly the entire surface of the sheet is exposed, for a purpose to be presently described. It will also be noted, by reference to the same figure, that the rack-cutting punches *f'* are in the same vertical plane with the teeth *e* on the ends of the stencil-roll.

The stripper and bed-plates T T and T' rest upon solid supports A^3 bolted to the side standards, A, of the machine. A socket-bearing is formed in each of these supports A^3, to receive a pin, H^2, passing down through the die-plate T into the block upon which said plate is mounted, and adapted to move smoothly up and down in its socket. Upon these pins (indicated by the reference-letter H^2) is mounted a horizontal bar or support, G^2, consisting of two metal plates, g^2 g^3, separated from each other by blocks D^4 D^4 inserted between the ends of the plates and bolted in place by nuts H^3 H^3 upon the pins H^2 H^2. A series of perforations are formed in the plates g^2 g^3 and vertical wires or marking-pencils W are placed therein, supported at a suitable height by washers *d*, attached to each pencil and resting upon the lower plate, g^3. Between these washers and the upper plate, g^2, are placed spiral springs n^2, by which the pencils are forcibly held down, while at the same time they will yield to any upward force strong enough to compress the springs n^2.

The blocks D^4 are extended outward and receive the ends of two vertically-reciprocating rods, I^2, one on each side of the machine. The blocks D^4 are attached to these rods by nuts *a' a'*. A projecting plate, m^2, is attached to each side of the machine at some distance below the support G^2, and between the blocks D^4 and said plates m^2 is placed a strong spiral spring, N^2, surrounding the rod I^2. These springs sustain the support G^2 at such a height that the pencils W are suspended with their points a short distance above the bed-plate T'.

The supporting-frame G^2 is reciprocated vertically by means of the rods or bars I^2, which are linked at their lower ends to a lever, M^2, having one of its ends pivoted to the machine. A cam, K^3, on the main shaft of the machine vibrates this lever, and at each revolution of the shaft this cam draws the rods downward, depressing the support G^2 far enough to bring the points of the pencils W into contact with the bed-plate T', over which the blank stencil-sheet is fed. The springs n^2 yield sufficiently to bring every one of the pencils into perfect contact with the sheet.

I have already directed attention to the fact that the rack-cutting punches *f'* are in the same vertical plane with the teeth *e* upon the ends of the stencil-roll. It will also be noticed that the number of pencils W corresponds with the number of perforating-punches *f*, and that each wire marks in the exact line of cut of the corresponding punch below. (See Fig. 2.) It should be remarked that, for the purpose of clearly showing the perforating mechanism, I have illustrated in the drawings two of the perforating-punches only, although the number usually employed is from fourteen (14) to thirty-nine (39.) Whatever the number may be, the marking-pencils W should correspond therewith.

I shall describe hereinafter the manner of feeding the blank stencil-sheet, whereby each step movement imparted thereto is equal to the space or length of a single cut of the perforating-punch. It follows, therefore, that the blank stencil-sheet, after passing through the machine, will appear as shown in Fig. 7 of the drawings, a rack being cut near its edges and its entire surface being marked with a series of dots arranged at exactly equal distances apart longitudinally, said distance between any two dots being equal to the length of a single cut of the paper-perforators, and therefore indicating the length of the shortest sound-opening formed in the sheet. In other words, this perforation would represent a note

of the lowest value as music is ordinarily written upon the staff. Prepared in this manner the blank stencil-sheet is ready to be delivered to the composer, who lays off upon its surface any given musical composition. His markings are made in the different longitudinal lines of dots in the manner well known to those acquainted with the art. The sheet is afterward perforated by a hand-stamp or punch, the operator cutting out the spaces marked by the composer. When finished it is ready to be put upon the machine, as shown at L, Fig. 5, and from this stencil or pattern any number of music-sheets may be cut by the automatic mechanism already patented to me under date of January 27, 1880.

Instead of wires W, carbon pencils may be used, or any other marking devices adapted for the purpose. When wire points are used sheets of impression-paper may be laid under them; but this is not essential, because the sharpened points of the wires W indent the surface of the paper sufficiently to render their markings very distinct.

I may add that the marking of the stencil-sheet, as above described, may be effected in a machine having no special apparatus for that purpose by merely passing the sheet over the stencil-roll and marking it by the pins *m* on the arms H, or by means of pencils secured to said arms H. These arms, being lifted by the yoke *p* at every revolution of the shaft and immediately lowered after the stencil is fed forward, are adapted to be used for marking in the manner described, although the process is considerably longer, and, moreover, the perforating mechanism cannot be used while the stencil is being marked, whereas in my present invention any number of blank stencil-sheets may be prepared without interrupting the perforating mechanism at all.

In feeding the paper sheet D, I have found by experience that difficulty may be met in using the feed-rolls shown in my patent named above, since a very slight inequality in the paper or in the surfaces of the feed-rolls may give a side twist or "skew" to the paper, and as the feed-rolls revolve farther this inaccuracy will increase, or else the sheet will wrinkle in recovering its proper position, and the feed-rolls will press each wrinkle into a fold, and very likely tear the sheet before it again straightens.

After considerable experiment I find that the best method of feeding the paper through the machine is by clamping it to a flexible belt, which will draw the sheet through between the die and stripper a single step at a time. For this purpose I have devised the apparatus illustrated in Figs. 1, 3, and 4.

In front of the machine I erect a strong frame-work, A′, extending some distance from the machine. Any suitable standards may support this structure; but it should be braced and bolted to the flooring to render it firm and steady. The top of the frame is upon a level with the stripper-plate E, so that the paper sheet may pass from the machine upon a horizontal plane, or nearly so. The top of said frame is composed of two parallel strips, A″, at each end of which is journaled a roll having its top in, or about in, the plane of the upper side of said strips A″. These strips are adapted to support a long endless belt, B′. This belt is constructed of separate slats of wood *b′*, (see Fig. 3,) riveted near each end to flexible or elastic strips of metal *b″*. The slats *b′* are placed close together, there being but a small space between, and each end of every slat is shod with a small rectangular plate of metal, b^3, which projects somewhat beyond the extremity of the slat. The length of the said slats *b′* is somewhat greater than the width of the blank stencil-sheet, and the projecting metal plates attached to the ends of said slats rest upon the edges of the strips A″. At the extreme end of the frame is a roll, having at its ends disks *c c*, which are notched at intervals, said notches being adapted to receive the ends of the metal plates b^3. It is from this roll that the belt receives motion, and these notched disks *c c*, by engaging with the slats of the belt, prevent the latter from slipping on the roll.

At frequent intervals upon the belt a slat is provided with elongated metal tips or plates, having the prolonged portion bent upward and then inward or toward each other. This construction, which is for a purpose shortly to be described hereinafter, may be seen in Fig. 4, where one of the slats *b′* is detached from the belt, the metal plates having the form I have mentioned being indicated by the reference-letter b^4.

To attach the paper sheet to the belt I use a clamp of peculiar form. This clamp is shown in Fig. 4 as connected with one of the slats of the belt. It is composed of a bar of wood, E^2, a little longer than the slats *b′*, said bar having a small flat metal plate, e^2, fastened to and projecting outward from each end of the bar E^2, the plates being attached to one vertical side of the bar, so that they stand in a vertical plane. At the center of the bar E^2 are placed two upright plates, *a a*, between which is mounted a cam, g^2, bearing against a pin, *h*, placed loosely in a socket in the bar. While the upper end of this pin bears against the cam g^2 the lower end rests on a thin steel plate, *i*, fastened at one end by a screw or rivet, *m*, to the bar and having the other end free.

In order to fasten the paper sheet D to the belt, the sheet is laid upon the slats of the belt and the clamp-bar E^2 is placed upon it at a point where lies one of the slats having prolonged and upwardly-bent plates e^2. The ends of the bar E^2 are inserted beneath the inwardly-bent ends of these plates until the metal pieces or plates e^2 come into contact with the plates b^4, care being taken to place the plates e^2 upon the side of the plates b^4 farthest from the machine, so that the pull of the paper sheet shall draw against the plates b^4. When the bar E^2

is in position the cam g^2 is turned down into the position shown in Fig. 4, whereby the steel plate *i* is firmly clamped against the sheet, the upward pressure of the cam being resisted by the hooked ends of the plates b^4.

The slats of the belt may be made of a single piece of metal cast in the proper form and connected to each other by a chain instead of an elastic strip; or a heavy strip of cloth may be used, and the feed-rolls at the end of the frame may be covered with rubber; or, again, a large drum may be used, the paper being clamped to its periphery in the same manner in which it is fastened to the belt. The stencil-sheet blank may also be clamped to the belt in the same manner, and may be fed to the rack-cutters and markers by this same belt at the same time that the paper sheet is fed to the perforating-punches. In order to accomplish this, an idler-roll, R^2, is journaled in standards at the end of the frame nearest the machine, the lower side of the roll being far enough above the belt to permit the passage beneath it of the blank stencil-sheet and one or more paper sheets. The edge of the bed-plate T′ is curved slightly, as shown in Fig. 5, and the stencil-sheet blank is carried therefrom down to and under the roll R^2, and, being laid upon the feeding-belt upon the top of the paper sheet, it is clamped down by a fastening-bar in the manner already set forth. This arrangement is shown in Fig. 1, and also in Fig. 3. It will be seen at once that by it I accomplish an important result in securing a feed for the blank stencil-sheet, which corresponds exactly to the feed of the paper sheet, while I am able also to cut the paper and to prepare the stencil at one and the same time.

The flexible belt passes over the rolls at the ends of the frame, and its weight is partly sustained beneath by an idler-roll, R. To give motion to the belt I employ a pawl-and-ratchet feed similar to that shown in my patent. The pitman D^2, Fig. 1, passes from the main shaft of the machine to the distant end of the frame, where it engages with a pawl-carrier, I, mounted on the shaft of roll, and having an eye, *d*′, through which the extremity of the pitman passes. Upon the end of the latter, which is screw-threaded for some distance, nuts *e e* are placed, one upon each side of the eye *d*′. By causing these nuts to approach or separate from each other the throw of the pawl *c*′ may be regulated and the rate of feed-movement of the belt correspondingly varied.

It may be desirable, owing to the length and weight of the pitman D^2, to attach to the frame A a support, within which the end of the rod may play.

It is obvious that in using this feed an operator must attend the machine to affix the clamps E^2, which must be removed from the belt when they reach the roll C, a second clamp having been previously affixed at the end nearest the machine. In this way the paper sheets and the stencil may be allowed to run off the belt upon the floor, where they may be rolled up as the perforated strips increase in length.

In my present invention I feed the stencil in a manner different from that shown in my patent of January 27, 1880. Instead of taking it from a pay-off roll, I let the sheet lie loosely upon the floor in a roll, as shown at L, Fig. 1. Thence it passes over the stencil-roll K″ to the take-up roll K′. The stencil-roll K″ is driven by a pawl-and-ratchet feed. (Shown at E F, Fig. 2, but requiring no description here, as it is the same as that shown and described in my patent for the same purpose.) The take-up roll K″ also is revolved by a belt, K, passing from a pulley on the main shaft to a pulley on the shaft of the roll. These parts, for the same reason just stated, need no description in this application.

In passing to the stencil-roll K″ the stencil-sheet may run over a narrow table, P, Fig. 1, and by placing one or more light blocks of wood upon the sheet to create a little friction it may be drawn tightly down upon the roll K″.

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

1. In a punching-machine, the combination, with the punches and their operating mechanism, of the stencil-sheet having openings of varied length and arrangement and an endless belt, to which the paper sheet or the stencil-sheet blank, or both, are clamped, and by which they are drawn step by step over the punches, substantially as and for the purpose set forth.

2. The combination, with the perforating mechanism, of an endless belt, the rolls at the ends of the supporting-frame A′, and the removable clamp-bar E^2, adapted to engage with said belt in the manner and for the purpose set forth.

3. An endless feeding-belt for perforating-machines, composed of slats attached to flexible strips and adapted to rest and slide upon the upper surface of the supporting-frame A′, in combination with a detachable clamping-bar resting upon said belt and adapted to engage with its slats, substantially as and for the purpose set forth.

4. The combination, with the stencil-roll, of a grooved or notched disk, a dog mounted on a reciprocating carrier above said disk, a cutting-punch placed above the dog, and a die and stripper-plate, between which the edge of the stencil passes, substantially as and for the purpose set forth.

5. The combination, with the punching mechanism, of a stencil-marking mechanism consisting of a series of marking points, wires, or pencils mounted on a reciprocating support and adapted to be brought into contact with the stencil-sheet blank at regular intervals, substantially as and for the purpose set forth.

6. The combination, with the punching and marking apparatus, of a rack-cutting mechanism consisting of a punch or punches arranged

to cut the stencil-sheet blank, said punches being controlled by corresponding dogs, which are mounted on a reciprocating carrier and caused to engage with the rack-cutters by means of a notched form on the stencil-roll, substantially as and for the purpose set forth.

7. The combination, with the perforating mechanism, the rack-cutting apparatus, and the marking devices, of a feeding mechanism consisting of a flexible belt passing over a suitable supporting-frame in front of the machine, adapted to feed either separately or simultaneously both the paper sheet and the stencil-sheet blank, the one to the perforators and the other to the marking and rack-cutting devices, substantially as and for the purpose set forth.

8. The combination, with the stencil-marking and rack-cutting mechanism, of the flexible feeding-belt and a roll mounted above it, the lower side of said roll being near the surface of the belt, and said roll being placed at the end of the frame nearest said marking and cutting mechanism, substantially as and for the purpose set forth.

9. A clamping-bar adapted to engage with the feeding-belt and attach the paper and stencil-sheet blank thereto, said bar consisting of a block having flat vertical projections at its ends, with a cam and a pin, *h*, in the center and a flat steel plate, *i*, upon the lower side, substantially as and for the purpose set forth.

10. A flexible feeding-belt consisting of slats connected by elastic or flexible strips, said slats being shod at their ends with projecting metal plates, certain slats in said belt being provided with plates, which are prolonged and bent upward and inward to furnish a fastening for the clamp-bar, substantially as set forth.

11. The combination of the frame A′ A″, the flexible belt, constructed as described, the roll journaled in standards at the end of the frame and above the belt, the clamp-bar, the pitman for driving said belt, the independent punches, the series of selecting and operating dogs, and the marking wires or pencils, substantially as set forth.

12. The combination, with the carrier M, of the dogs *g*, having arms H′, curved or deflected outwardly, and the disks D′ upon the stencil-roll, having notches *a*, substantially as and for the purpose set forth.

13. In a paper-perforating machine, the combination, with the independent dogs and punches, the carrier-frame on which said dogs are mounted, and the stencil-roll having notched disks mounted thereon, of the rack-cutting punches and a series of pencils or wires adapted to be reciprocated against a bed-plate over which the stencil-sheet blank is fed, substantially as and for the purpose set forth.

14. The combination, with the stencil-roll having teeth or cogs *e e*, of a single take-up roll, a friction-table, over which the stencil passes before reaching the roll, and devices for feeding both the stencil and the take-up roll, the latter being adapted to slip upon its shaft when the stencil is at a suitable tension, substantially as and for the purpose set forth.

15. The combination, with the supporting-bar G^2, of the marking-wires W, mounted movably in said bar, the springs n^2, and mechanism for reciprocating said bar, substantially as and for the purpose set forth.

16. The combination, with the marking wires or pencils W, of the bed-plate T′, the die-plates upon each side thereof, the rack-cutters *f′*, the dogs *g*, having bent arms H′, and the stencil-roll K″, provided with notched disks, all substantially as and for the purposes set forth.

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

ROSWELL T. SMITH.

Witnesses:

CHAS. B. TILDEN,

C. E. P. SMITH.