

(No Model.)

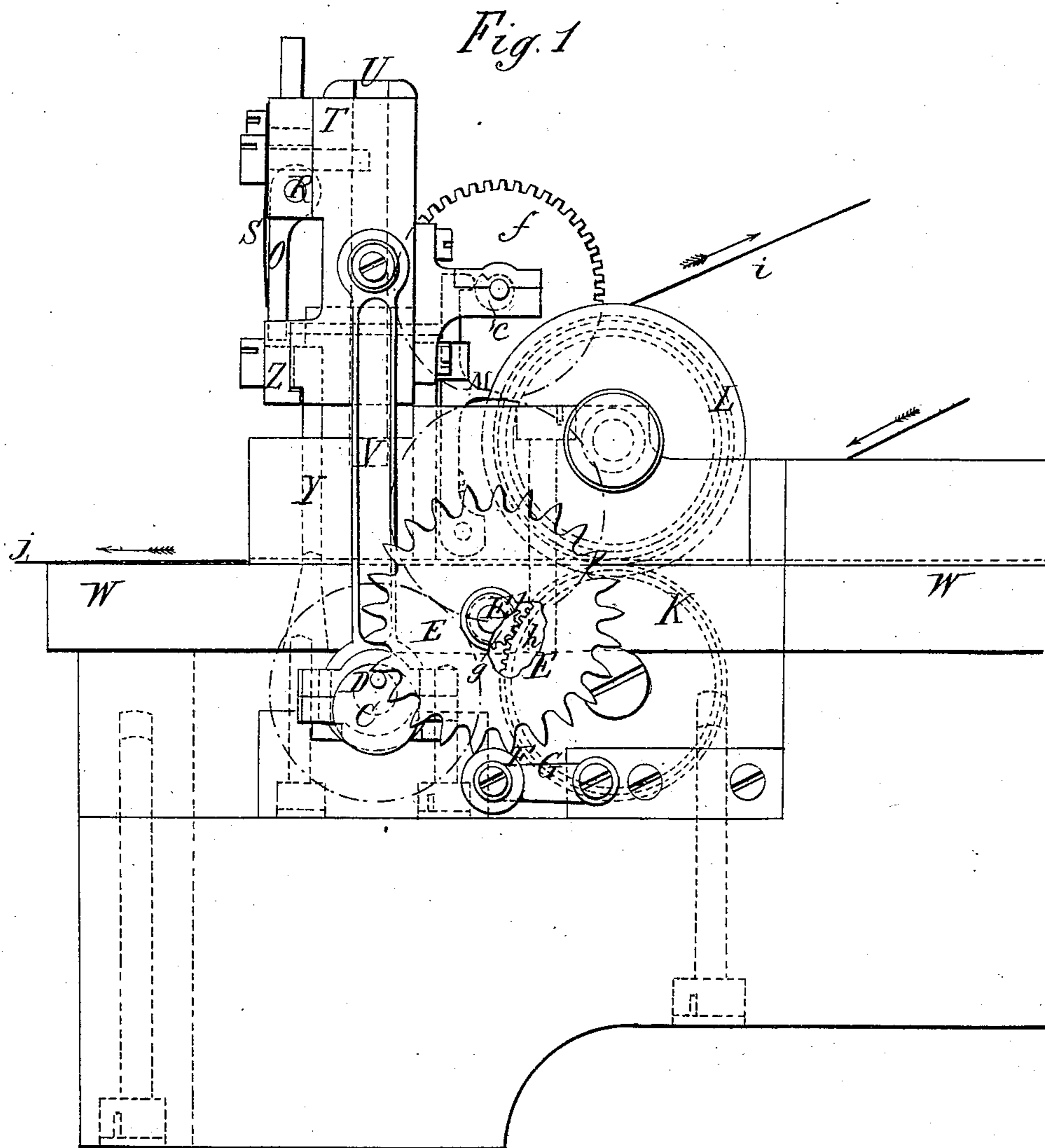
4 Sheets—Sheet 1.

J. CARPENTIER.

MACHINE FOR PERFORATING MUSIC BANDS.

No. 389,872.

Patented Sept. 25, 1888.



Witnesses;
John A. Reupie
Wm. H. Hannam

Inventor;
Jules Carpentier
By his Attorneys;
Arthur C. Brazer & Co.

(No Model.)

4 Sheets—Sheet 2.

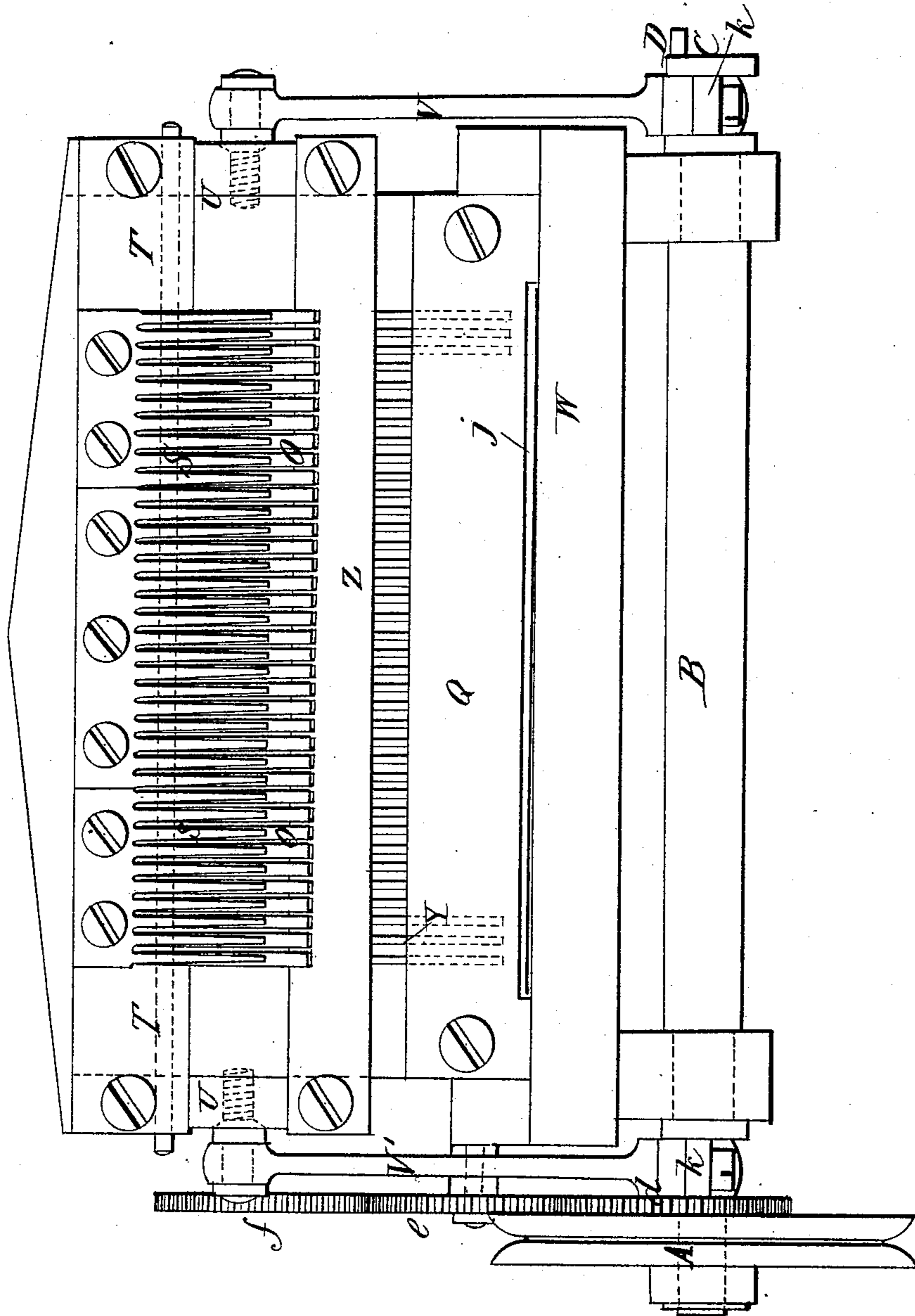
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Fig. 2



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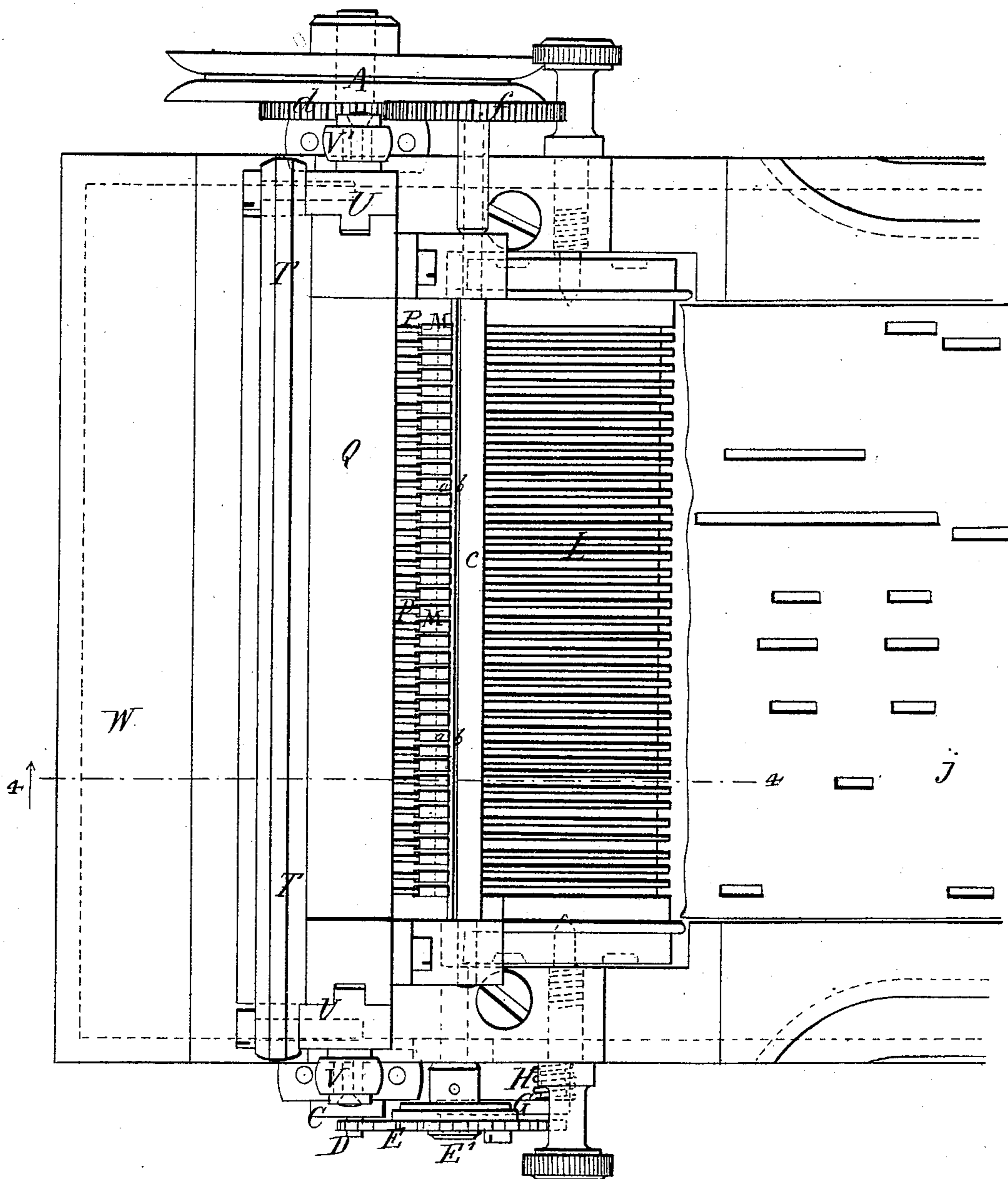
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Fig. 3



Witnesses:
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(No Model.)

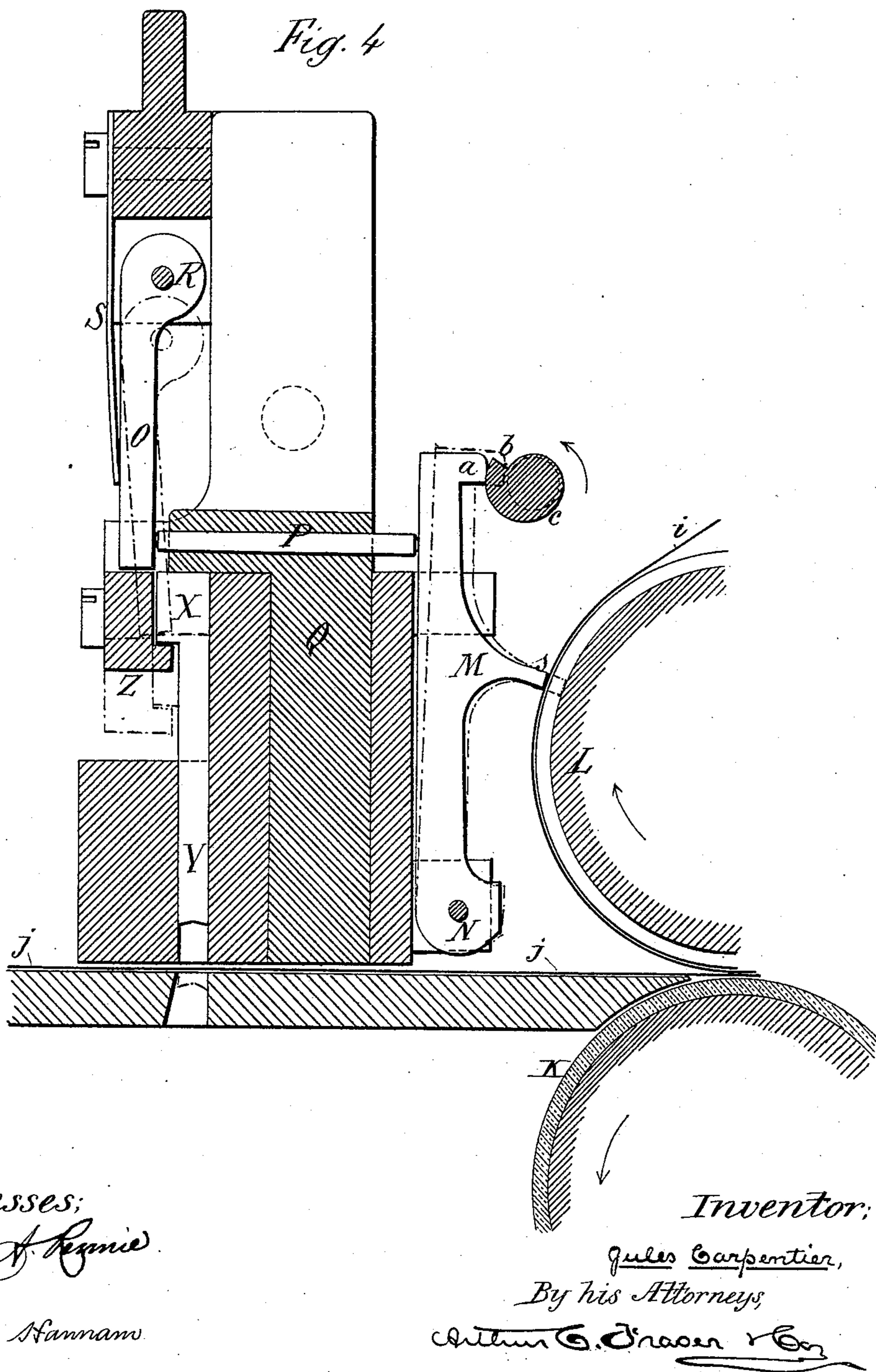
4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

JULES CARPENTIER, OF PARIS, FRANCE.

MACHINE FOR PERFORATING MUSIC-BANDS.

SPECIFICATION forming part of Letters Patent No. 389,872, dated September 25, 1888.

Application filed June 27, 1887. Serial No. 242,566. (No model.) Patented in France February 25, 1885, No. 167,277; and in England May 17, 1887, No. 7,194.

To all whom it may concern:

Be it known that I, JULES CARPENTIER, a citizen of the French Republic, residing in Paris, France, have invented certain new and useful Improvements in Machines for Perforating Music-Bands, of which the following is a specification.

This invention is the subject of a patent in France, No. 167,277, dated February 25, 1885, and in England, No. 7,194, dated May 17, 1887.

This invention relates to machines for preparing the perforated bands of paper employed for actuating automatic musical instruments.

In my application for patent for apparatus for mechanically playing keyed musical instruments filed May 28, 1887, Serial No. 239,655, I have described an automatic musical apparatus employing a band of perforated paper, and which apparatus I term a "Melotrope." This apparatus presents the advantages over others of the same class—such as the pianista, which are, like it, automatic auxiliaries of the piano—of being more simple, more convenient, and of cheaper construction. Nevertheless the use of the melotrope would be relatively limited if it were not possible to procure at a moderate price the perforated bands which translate for the instrument the musical airs to be played on the piano.

The object of my present invention is to provide an improved and simplified machine by means of which the perforation of automatic music-bands shall be accomplished cheaply and automatically. In machines for this purpose a series of punches is provided arranged in a line facing the band of paper to be perforated, which is fed through the machine, and the action of these punches in perforating this band of paper is determined by means of a band of paper previously perforated, which band is called the "type-band," and the perforations in which are by the action of the machine reproduced identically in the new band to be perforated. The latter may be of paper, card-board, metal, or other material, and one or more bands may be superposed and punched simultaneously.

In my machine the punches are driven by hammers which are reciprocated up and down

and are moved into or out of the path of the punches through the action of "feelers" or fingers which come against the type-band, and which, when they encounter the imperforate portions thereof, hold the hammers out of engagement with the punches; but when any of the feelers are displaced by entering the perforations in the type-band the hammers corresponding to them are thereby moved into the path of the punches and the corresponding punches are driven and caused to punch the paper. The feelers do not participate in the driving movement of the hammers, but remain stationary, or substantially so, during such movement. The connection of the feelers with the hammers is of such character that the feelers move the hammers only in lateral direction and do not interfere with the longitudinal movement of the hammers in punching. The hammers are driven simultaneously and are retracted after each punching movement by the reciprocation of a frame to which they are connected.

I will now proceed to describe the construction of my improved machine with reference to the accompanying drawings, wherein—

Figure 1 is a side elevation of the machine. Fig. 2 is a front elevation thereof. Fig. 3 is a plan thereof; and Fig. 4 is a vertical transverse section cut in the plane of the line 4 4 in Fig. 3, and showing the most essential operative parts upon a larger scale than the preceding figures.

The machine is driven through the medium of a belt-pulley, A, fixed on the end of a shaft, B. To the opposite end of this shaft is fixed a disk, C, carrying an eccentric pin or stud, D. At each turn of the shaft B this stud D engages one of the notches of a toothed wheel, E, and turns the latter the space of one tooth. The wheel E is held after each intermittent movement by an arresting device consisting of a friction-roller, F, carried at the end of an arm, G, and pressed toward the wheel by a coiled spring, H, Fig. 3, at the pivot of the arm. The roller F enters between two of the teeth on the wheel E and holds the latter stationary until it is moved by the stud D, whereupon the roller F is depressed by the passage of one tooth and returns again into the next

notch, where it holds the wheel until the next movement. The shaft E', on which the wheel E is fixed, carries a pinion, *g*, which gears with a toothed wheel, *h*, fixed to a feeding-roller, K, which is covered with india-rubber to give it a frictional surface. Above the roller K is a similar roller or cylinder, L, of metal or other material, formed with peripheral grooves. Between these two rollers K and L pass the two bands of paper—the type-band or master-band *i* and the band of paper to be perforated, *j*. The former passes around the grooved cylinder L, while the latter passes in a horizontal direction over the top of the table W. By means of the mechanism thus far described, which I will refer to as the "feeding mechanism," both bands are fed through the machine intermittently, making a short forward movement to each rotation of the driving-shaft B.

Y Y are the punches for perforating the sheet *j*. They are mounted in vertical holes or grooves in an upright fixed frame, Q, which stands above the table W. Each punch has a projecting head, X, forming an overhanging shoulder, under which projects a ledge, Z, as shown in Fig. 4, forming part of a vertically-reciprocating frame, T, which is mounted to slide in vertical guides U U at the opposite ends of the frame Q. The frame T is continuously reciprocated by means of pitmen or connecting rods V V', which are connected to it at their upper ends, and to cranks or eccentrics *k k* on the driving-shaft B at their lower ends.

The frame T is the hammer-carrying frame. To it are pivoted as many hammers O O as there are punches Y Y, each hammer being arranged directly over its respective punch, and all being pivoted on an axis, R, and pressed rearwardly by springs S S. Their construction is best shown in Fig. 4. Each hammer O is capable of a slight forward or rearward motion at its lower end. It is shown in full lines in Fig. 4 in its forward position. When in this position, it clears the head X of the punch during its downward movement, and the punch is not driven; but when in its backward position, as shown in dotted lines, its end encounters the head of the punch and in its descent forces down the punch and causes the latter to perforate the paper. Behind each hammer O is a sliding pin or rod, P, which moves freely in a horizontal hole in the frame Q. The forward end of each rod P bears against the hammer O, and its rear end bears against a lever, M, which is pivoted on an axis at N. This lever is formed with a finger or projection, *s*, which comes in contact with the type-band *i*, and constitutes the feeler hereinabove referred to.

It will be understood that there are as many punches Y Y, hammers O O, pins P P, and feelers M M as there are rows of perforations in the respective music-bands. Each set or group of these devices operates independently of every other set or group thereof. Fig. 4

shows one set or group—that is to say, one feeler M, and one punch Y, with the hammer which operates this punch, and the intermediate devices by which this hammer is controlled by the feeler. It will also be understood that the grooves in the cylinder L correspond in number and arrangement with the rows of perforations in the music-sheet *i*, and with the fingers *s s* of the feelers M M, so that each finger *s* comes in contact with the type-band *i* in line with a row of perforations therein, and when it encounters a perforation it is able to move into the same by entering the corresponding groove in the cylinder L.

The feelers M M are pressed toward the type-band *i* by the springs S S, the pressure of which is transmitted to them through the medium of the hammers O O and sliding rods P P. The feelers M M are retracted by means of a cam, *c*, which rotates synchronously with the driving-shaft B, being driven therefrom through gears *d*, *e*, and *f*, as shown in Fig. 2. This cam acts against a projecting head, *a*, at the top of each feeler M, and serves to move forward to the position shown in full lines in Fig. 4 all the feelers M M and hammers O O, thus retracting the fingers *s s* clear of the type-band *i*. This being done, the feeding operation takes place, by which the bands *i* and *j* are advanced a short distance. At the same instant the hammers O O are elevated, their frame T being in its highest position. The feelers M M are then released by the abrupt side *b* of the cam *c* clearing their heads *a a*. Thereupon all the feelers move backward, some of them being instantly arrested by the contact of their fingers *s* with unperforated portions of the type-band *i*, while some of them are permitted to move entirely back by reason of their fingers *s* dropping into perforations in the type-band. In the latter case the hammers O O, corresponding to these feelers, are moved into the position shown in dotted lines in Fig. 4, with their lower ends over the heads of the punches Y Y. The frame T then moves down, whereupon the hammers O O, which have been thus displaced, drive down the corresponding punches Y Y and cause them to perforate the paper band *j*, while the punches corresponding to the hammers which were not displaced remain elevated. On the upstroke of the frame T the punches which have been forced down are raised again to their normal positions by means of the ledge Z, which in its ascent takes under the projecting portions of the heads X of the punches. Meanwhile the cam *c* has been retracting the feelers M M, and by the time the upstroke of the frame T is nearly completed has moved them clear of the type-band *i*, whereupon another feed takes place, and the operations described are repeated. Thus to each revolution of the driving-shaft the paper bands are fed forward a little, the feelers are brought into contact with the type-band, and if any of them enter perforations therein the punches corresponding to such feelers are driven through the unperforated

band and punch corresponding perforations therein. In the case of a long perforation or slot, which is to produce a prolonged note, the feeler corresponding thereto will enter it a number of times successively proportionally to its length, and the corresponding punch will be driven an equal number of successive times and will punch holes which, so to speak, overlap each other, the result being that an elongated perforation is produced in the band *j*, the length of which is proportional to that in the band *i*. Thus by the operation of my machine the band *j* is perforated with holes which correspond in arrangement and in relative length to those in the type-band *i*.

It will be understood that my invention is susceptible of considerable modification without departing from its essential features. For example, the hammers and punches may be differently constructed; the feelers need not be levers, but may be any device which may be controlled by the perforated type-band and which will suffice to control the action of the hammers on the punches, and the connection between the feelers and the hammers may be effected by different means. The type-band for governing the action of my machine need not necessarily be a perforated band, but might be an embossed band, or a band formed with projections; or it might be a cylinder having projections, all of which are well known in the art. All of these modifications come within the domain of mechanical construction and adaptation, and do not affect the essential features of my invention.

I claim as my invention the several improvements in machines for perforating bands for automatic musical instruments, defined as follows, substantially as hereinabove specified, namely:

1. The combination of a series of punches, a corresponding series of hammers for driving said punches, and a corresponding series of feelers arranged to be pressed against the type-band which controls the machine and co-operating with said hammers but distinct therefrom, so that they need not participate in the punching movement thereof, substantially as set forth.

2. The combination of a series of punches, a corresponding series of hammers for driving said punches, and a corresponding series of feelers arranged to be pressed against the type-band which controls the machine and distinct from said hammers, so that they need not participate in the punching movement thereof, and intermediate connections between said hammers and feelers and in operative contact therewith, whereby when any feeler is displaced by entering a perforation in the type-band it causes, through said intermediate connection, the corresponding hammer to be displaced into the path of its punch, thus driving the latter, substantially as set forth.

3. A series of punches, a corresponding series of hammers for driving the punches, and a corresponding series of feelers arranged to

be pressed against the type-band which controls the machine and distinct from said hammers, so that they need not participate in the punching movement thereof, and intermediate connections between said hammers and feelers and in operative contact therewith, whereby when any feeler is displaced by entering a perforation in the type-band it causes, through said intermediate connection, the corresponding hammer to be displaced into the path of the punch, thus driving the latter, in combination with springs pressing against the respective hammers and acting through them and said intermediate connections on the feelers, and a restoring mechanism acting on the feelers and pressing them back to free them from the type-band after each punching, and thereby, through them and said intermediate connections, restoring the punches, substantially as set forth.

4. A series of punches, a corresponding series of hammers for driving said punches, a corresponding series of feelers arranged to be pressed against the type-band which controls the machine and distinct from said hammers, so that they need not participate in the punching movement thereof, and intermediate connections between said hammers and feelers, whereby when any feeler is displaced by entering a perforation in the type-band it causes, through said intermediate connection, the corresponding hammer to be displaced into the path of its punch, thus driving the latter, in combination with springs acting to press the respective feelers toward the type-band, and a cam acting to press back the feelers and free them from the type-band, and then to release them and permit them to be pressed back against the same, substantially as set forth.

5. The combination of a series of punches, a corresponding series of hammers for driving the punches, a corresponding series of feelers arranged to be pressed against the type-band which controls the machine and distinct from said hammers, so that they need not participate in the punching movement thereof, a connection between the respective hammers and feelers, consisting of pins sliding longitudinally in guiding-holes, and arranged with the one end abutting against the hammers and the other end against the feelers, and springs pressing against the respective hammers and acting through them and the pins on the feelers, whereby when any feeler is displaced by entering a perforation in the type-band the corresponding pin is relieved and the corresponding hammer is permitted to be displaced by its spring into the path of its punch, whereby it is caused to drive the latter.

6. The combination, with a feeding mechanism for advancing the band of paper, of a series of punches having shoulders thereon, a corresponding series of hammers for driving said punches, a reciprocating frame for driving said hammers and having a ledge taking under the shoulders on said punches to restore the latter after they have been driven, a series of

feelers independent of said hammers, and intermediate connections between said levers and feelers and in operative contact therewith, whereby the displacement of the feelers will effect a lateral displacement of the corresponding hammers and bring the latter into the paths of the punches, substantially as set forth.

7. The combination of punches Y Y, hammers O O, springs S S, feelers M M, connected to the hammers but distinct therefrom, cam c, for retracting the feelers and hammers, frame T, for driving the hammers, and a feeding mechanism acting intermittently after each punching movement.

8. The feeding mechanism consisting of rollers K L, the toothed wheel E, connected to and driving one of said rollers, the driving-shaft B, carrying crank-stud D, engaging the teeth in said wheel and turning the latter one tooth at each revolution, and the spring-seated roller F, engaging the teeth of said wheel and holding the latter stationary when not acted on by said stud.

9. A series of movable punches, a reciprocating frame connected with said punches, so as to lift the same, and a series of hammers pivoted to said reciprocating frame and acting upon said punches to cause the same to perforate the music-band, in combination with the traveling perforated type band, a series of pivoted feelers having fingers which enter the perforations in said type-band, a series of sliding

pins, each of which has one end in contact with one of said hammers and its other end in contact with one of said feelers, and mechanism, substantially as described, for keeping said pins at all times in contact with said hammers and fingers, substantially as set forth.

10. A series of movable punches, a reciprocating frame connected with said punches, so as to lift the same, and a series of hammers pivoted to said reciprocating frame and acting on said punches to cause the same to perforate the music-band, in combination with the traveling perforated type-band, a series of pivoted feelers having fingers which enter the perforations in said type-band, a series of pins sliding in a direction at substantially right angles to the movement of the reciprocating frame, each of which has one end in contact with one of said hammers and its other end in contact with one of said feelers, springs fixed to the reciprocating frame and acting upon said hammers to press them toward the feelers, and a rotary cam-shaft acting upon said feelers to press them toward the hammers, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JULES CARPENTIER.

Witnesses:

ROBT. M. HOOPER,
AMAND RITTER.