Dec. 29, 1942. H. SCHÜLER 2,306,905

MACHINE FOR PRINTING MUSICAL NOTATION

Filed July 5, 1940

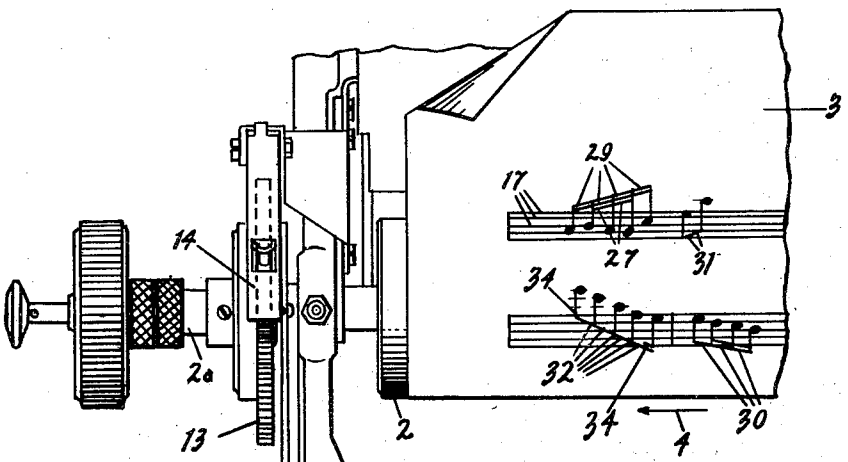


Fig. 1.

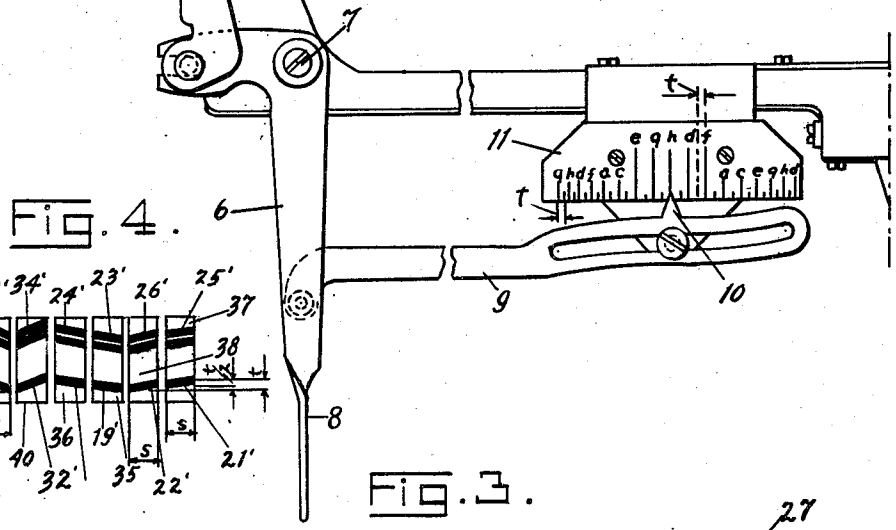


Fig. 4.

Fig. 3.

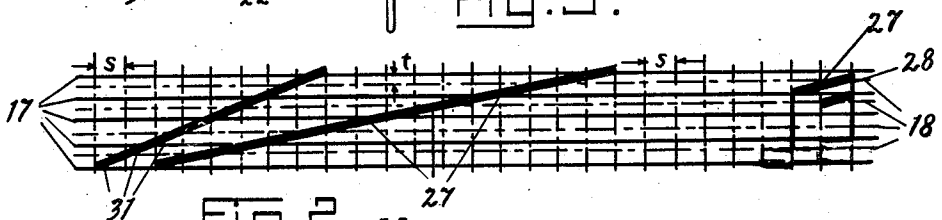
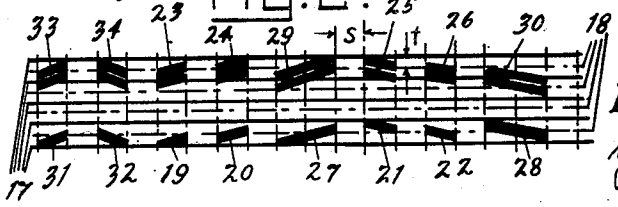


Fig. 2.



Inventor
Hugo Schüler

By Young, Emery & Thompson
Attorneys

Patented Dec. 29, 1942 2,306,905

UNITED STATES PATENT OFFICE

2,306,905

MACHINE FOR PRINTING MUSICAL NOTATION

Hugo Schüler, Siegmar-Schonau, Germany; vested in the Alien Property Custodian

Application July 5, 1940, Serial No. 344,168
In Germany August 1, 1939

1 Claim. (Cl. 197—8)

This invention relates to types for printing oblique bars, connecting strokes or the like in machines for printing musical notation, in which the sheets to be printed are movable in horizontal and in vertical direction by steps of determined length.

In printing musical notation it is frequently necessary to connect groups of eighth, sixteenth, thirty-second, or sixty-fourth notes by bars or strokes known as "hooks" which extend from the free ends of the stems of the notes and are inclined upwardly or downwardly according to the positions of the notes in the group. In music printing machines special types are provided for reproducing such hooks, which types print the several sections of the oblique bars or strokes forming said hooks. To enable longer hooks to be printed by these type it is necessary to combine the individual hook sections, and the printing sheet after the printing of one hook section has to be advanced one step horizontally and also shifted a certain amount in the vertical direction so that the imprints of the hook sections connect up with each other to form continuous strokes. In known music printing machines, after each printing of a hook section two shift operations are required. Also in the known note printing machines narrow limits are imposed on the inclination of the hooks which is determined by the ratio of the horizontal shift step length to that of the vertical shift step.

The object of the present invention is to simplify the printing of continuous connecting hooks and particularly to allow the rapid and reliable printing of slightly inclined hooks, connecting strokes, and the like. According to the present invention two hook characters each extending over one horizontal step and having a slope corresponding to one half of a vertical step are arranged on two type heads and so displaced from each other that upon directly succeeding single printings by these type heads a continuous coherent hook stroke is printed extending over two horizontal steps and one vertical step. In the same music printing machine also hook printing types may be provided for printing hooks or grouping lines of steeper inclination determined by one horizontal and one vertical shift step.

An embodiment of the invention is illustrated by way of example in the accompanying drawing in which;

Figure 1 is an elevation of a portion of a paper carriage of a musical notation printing machine with vertical shifting mechanism,

Fig. 2 is a diagrammatic view showing different hook characters,

Fig. 3 is a diagrammatic view showing different hooks printed by said characters, and

Fig. 4 is a face view of the type heads.

In the embodiment illustrated, the paper carriage 1 of a musical notation printing machine has a paper roller or platen 2 rotatably mounted therein. The sheet 3 to be printed upon can be placed in conventional manner around the roller 2. The paper carriage 1 with the roller 2 and sheet 3 are shifted along horizontally during printing in the direction of the arrow 4 which can be effected by a mechanism not shown such as a carriage shift mechanism as used in typewriters, which mechanism is operated by the printing keys or a space key. The shift steps are of equal length, this length depending upon the pitch of the teeth of the escapement wheel of the paper carriage shift mechanism.

To adjust the sheet 3 to the desired elevation at which the various notes of the musical notation are to be printed there is used a vertical step shift mechanism. This vertical step shift mechanism comprises in the example a shift lever 6 provided with a handle 8 and which is pivotally mounted at 7 on the paper carriage 1 and is jointed to an arm 9 having a pointer 10. The pointer 10 of the arm 9 cooperates with a scale 11 on which division marks are provided indicating the different note levels. At the other end of the bell crank shift lever 6 there is jointed a connecting rod 12 connected to a toothed segment 13 fixed on the shaft 2a of the paper roller. A spring pawl 14 engages the teeth of the segment 13 and serves to hold the segment in adjusted position, which position can be read at any time on the scale 11. On clockwise rocking of the shift lever 6 about its axis 7 from the middle position shown in Fig. 1, the pointer 10 moves to the left along the scale 11 and the connecting rod 12 and segment 13 move in the direction of the arrow 15. On rocking the lever 6 in counter-clockwise direction the pointer 10 will move to the right over the scale 11 and the connecting rod 12 and segment 13 will move in the direction of the arrow 16.

By means of this vertical shift mechanism the various note characters are printed in the desired position with respect to the staff lines of the musical notation. In the ordinary notation there are five staff lines 17 which are printed at the beginning of the printing operation while the vertical shift mechanism is in the middle position shown in Figure 1. The pointer 10 is hereby set to the middle division *h* of the scale 11 which corresponds to the middle line of the five staff line

system. The teeth of the segment 13 and the divisions on the scale 11 are so arranged that one tooth pitch corresponds to one-half the spacing between two staff lines 17 so that the notes can be printed in any pitch position, that is either upon the staff lines 17 or ledger lines, or between the staff lines 17 or ledger lines.

Figure 2 shows such a stave with the five staff lines 17 on a larger scale. The intermediate positions between the staff lines 17 are shown by horizontal chain dotted lines 18. The elevation of one vertical step corresponding to the space between lines 17 and 18 is designated *t*. The beginning and end of each horizontal shift step is shown by a vertical chain dotted line. The distance between two of these lines succeeding one another is equivalent to a horizontal shift step the length of which is designated *s*.

In order to print inclined hooks, connecting lines, or the like, the present invention provides type heads 35, 36, 37, 38 with hook characters 19', 20' and 21', 22' (Fig. 4) which extend over one horizontal shift step *s* and one half of a vertical shift step *t*. These type heads make impressions 19, 20, 21, 22 as shown in Fig. 2; the characters 19, 20 sloping upwards from left to right and the characters 21, 22 sloping downwards from left to right. The hook characters 19', 20' and 21', 22' are each arranged on two type heads 35, 36 and 37, 38 and displaced from each other by half of a vertical step *t* in such a manner that upon direct successive printing of two of these characters the hook lines 27, 28 are printed extending over two horizontal steps *s* and one vertical step *t*. In this printing of the characters 27, 28 it is not necessary to operate the vertical shift mechanism of the machine between the two printings required to complete the hook structure.

In the same way as the grouping lines 27 and 28 are printed by successive operation of the types 19', 20' and 21', 22', the grouping lines 29 and 30 are printed by successive operation of the types 23', 24' and 25', 26'.

Other hook characters 23, 24 and 25, 26 are provided corresponding in inclination to the hook characters 19—22, which consist not of one stroke like the hook characters 19—22, but of two strokes spaced vertically from each other, for instance, by the distance *t*, said strokes extending parallel to each other. The hook characters 23—26 are of the same length as the hook characters 19—22. The hook characters 19'—22' can be used to print the hook strokes for groups of one-eighth notes, and the hook characters 23'—26' for printing the hook strokes of groups of one-sixteenth notes. Hook strokes for groups of thirty-second notes and sixty-fourth notes can be printed by repeated printing of the hook characters 19'—22' or 23'—26', above or below each other. Long slightly inclined hook strokes can thus be quickly, easily and reliably printed by means of the present invention. Preferably the characters 19', 20'; 21', 22'; 23', 24'; 25', 26' which produce a continued coherent hook stroke in successive printings are arranged on two type heads 35, 26; 37, 38; 35, 36; 37, 38 respectively actuated by adjacent keys in the key board of the machine. Thereby the rapidity with which the hook strokes can be printed is substantially increased. The characters 19' and 23', 20' and 24', 21' and 25' and 22' and 26' can be arranged if desired on a single type head 35, 36, 37, 38 respectively whereby the characters of such a pair can be printed in different shifts of the machine.

To print slightly inclined hook strokes and the like it is possible instead of providing a pair of associated hook characters whose impressions become joined to arrange three or more such hook characters on three or more type heads. Thus for example three hook characters each extending over one-third of a vertical shift step and over one horizontal shift step and displaced from each other by one-third of a vertical step, can be arranged directly in sequence. The result of printing all three characters is then a hook stroke which extends over three horizontal shift steps and over a single vertical step.

From the foregoing it is clear that the invention makes it possible for hook stroke or connection line inclinations of any desired slope to be printed directly, by suitably selecting the inclination and number of the individual hook characters and their appropriate displaced position on the type heads.

The musical notation printing machine according to the present invention may be provided not only with the hook characters 19'—26' but also with further hook characters 31'—32' which extend over one horizontal shift step *s* and one vertical shift step *t*. These hook characters 31', 32' enable connected lines and hook strokes of greater inclination to be printed. The printing of corresponding double lines running parallel to each other and spaced by one vertical step is facilitated by providing hook characters 33', 34'. The hook characters 31', 33' and 32', 34' producing the impressions 31, 33, 32, 34 are preferably arranged in pairs on the same type head 39, 40 so that the characters 31, 32 are printed in one shift position, and the characters 33, 34 in another shift position of the machine. However, they can also be arranged on different type heads.

The hook characters 19—26 and 30—34 shown in Figure 2 are adjusted with the middle staff line of a stave in printing position on the paper roller, the half of the spacing of the staff lines corresponding to the step *t*. This means that in the given position of the stave the hook characters start from the said middle line or are printed at a determined vertical distance from this middle line. By turning the paper roller 2 by means of the vertical shift lever 6, 8, with the result of shifting the staff lines to different positions, relatively to the printing place of the types, which positions can be read on the scale 11, it is made possible to print the hook characters at different vertical positions with respect to the lines 17 of the stave.

Fig. 3 shows different hook strokes printed by means of the various hook characters described. First there is a continuous hook stroke 31 of relatively steep inclination. This is printed by first setting the hook character 31 in the desired initial position, which is effected by suitable actuation of the lever 6, 8 and observation of the scale 11, and causing it to make an impression, whereby the paper carriage 1 and paper sheet 3 is advanced one horizontal step *s* in the direction of the arrow 4. The pointer 10 is then shifted by means of the lever 6, 8 through one step *t* to the right, Fig. 1, whereby the paper roller 2 is rotated by one vertical shift step *t*, whereafter the hook character 31 is printed again, and the whole operation is thereafter repeated until the upwardly inclined hook stroke has attained its desired length.

The hook stroke 27 of lesser inclination shown in Fig. 3 is produced in the following manner.

After suitable setting of the vertical shift mechanism, in the example to the lowest staff line **17**, the hook character **19** and then the hook character **20** are printed. On striking the key for the hook character **19** the paper carriage moves to the left by one horizontal shift step *s* and on subsequent striking of the key for the hook character **20** the stroke printed thereby joins itself directly to the impression of the character **19** owing to the displaced arrangement of the two characters on their type heads, thus forming a continuous coherent stroke. Between the printing of the two characters **19** and **20** it is not necessary to operate the vertical shift means of the machine. It is only when both characters **19**, **20** are printed that the paper roll must be shifted a vertical step *t* by corresponding operation of the operating lever **6**, **8** in order that the next hook character **19** may make its imprint join up with the end of the last printed hook stroke **20**. After printing of this next hook character **19**, the character **20** can be printed to join up without further actuation of the vertical shift means. Subsequently another rotation of the paper roll through one vertical shift step *t* must take place, and so on, until the hook stroke has attained the desired length. Since according to the invention the vertical shift means, in printing slightly inclined strokes, has to be actuated only after each second printing, the invention makes it possible to dispense with one-half of the previously required vertical shift operations so that the work of the notation printing machine is much more rapid.

At the right hand end of Fig. 3 there is shown how the slightly inclined strokes can be used for connecting a group of notes consisting of a dotted eighth note and a sixteenth note. In this printing the hook stroke **27** is first joined to the free ends of the stems of the notes by printing the two characters **19**, **20** and thereafter the character **20** is again printed at a spacing of, for instance, one vertical step below the first printed character **20**. It is also possible to join the hook stroke **19** to the free end of the first note stem and, then, to print the character **24** in such a manner that the upper of the two strokes of the character **24** forms a continuation of the first printed stroke **19**.

On the paper sheet **3** shown mounted on the paper roller **2** in Fig. 1 there are shown printings which can be performed by means of the invention.

I claim as my invention:

In a machine for printing musical notation on writing paper in correspondence with equally spaced staff lines, means for shifting the writing paper in the direction of the staff lines in horizontal steps of predetermined length, means for shifting the writing paper perpendicularly to the staff lines in vertical steps of a length equal to one half of the distance of the staff lines from each other, and at least one pair of types for printing grouping lines, each type of said pair of types having a hook character thereon extending over one horizontal shifting step and having a slope corresponding to one half of a vertical shifting step, the hook characters being arranged in positions differing by one half of a vertical shifting step for printing a continuous coherent hook extending over two horizontal shifting steps and one vertical shifting step upon direct successive single printings of the two types.

HUGO SCHÜLER.