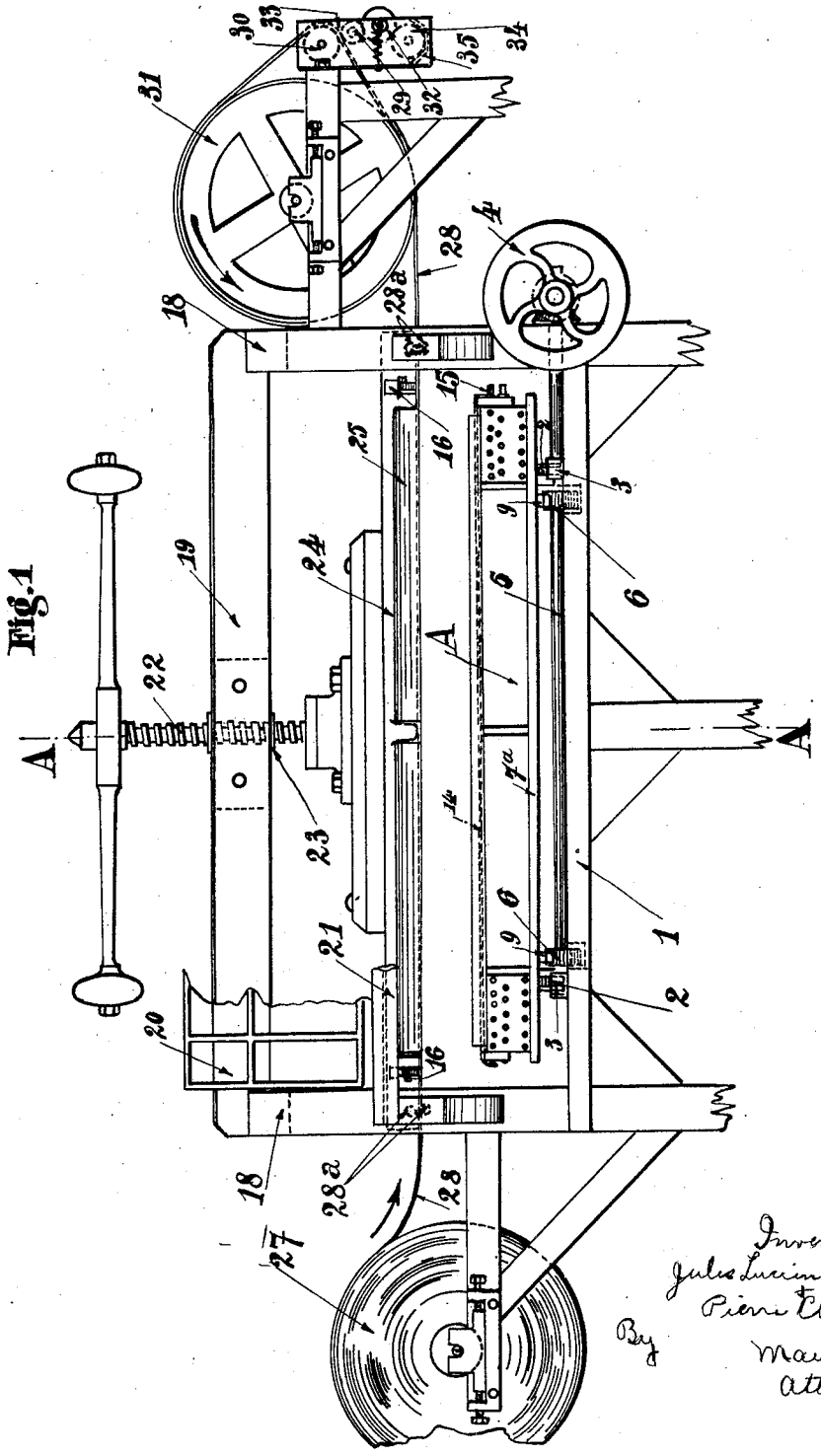
Aug. 27, 1929. J. L. LENOUVEL ET AL 1,726,110

MACHINE FOR SETTING UP AND PRINTING MUSIC

Filed July 15, 1927 4 Sheets-Sheet 1

Fig. 1



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MACHINE FOR SETTING UP AND PRINTING MUSIC

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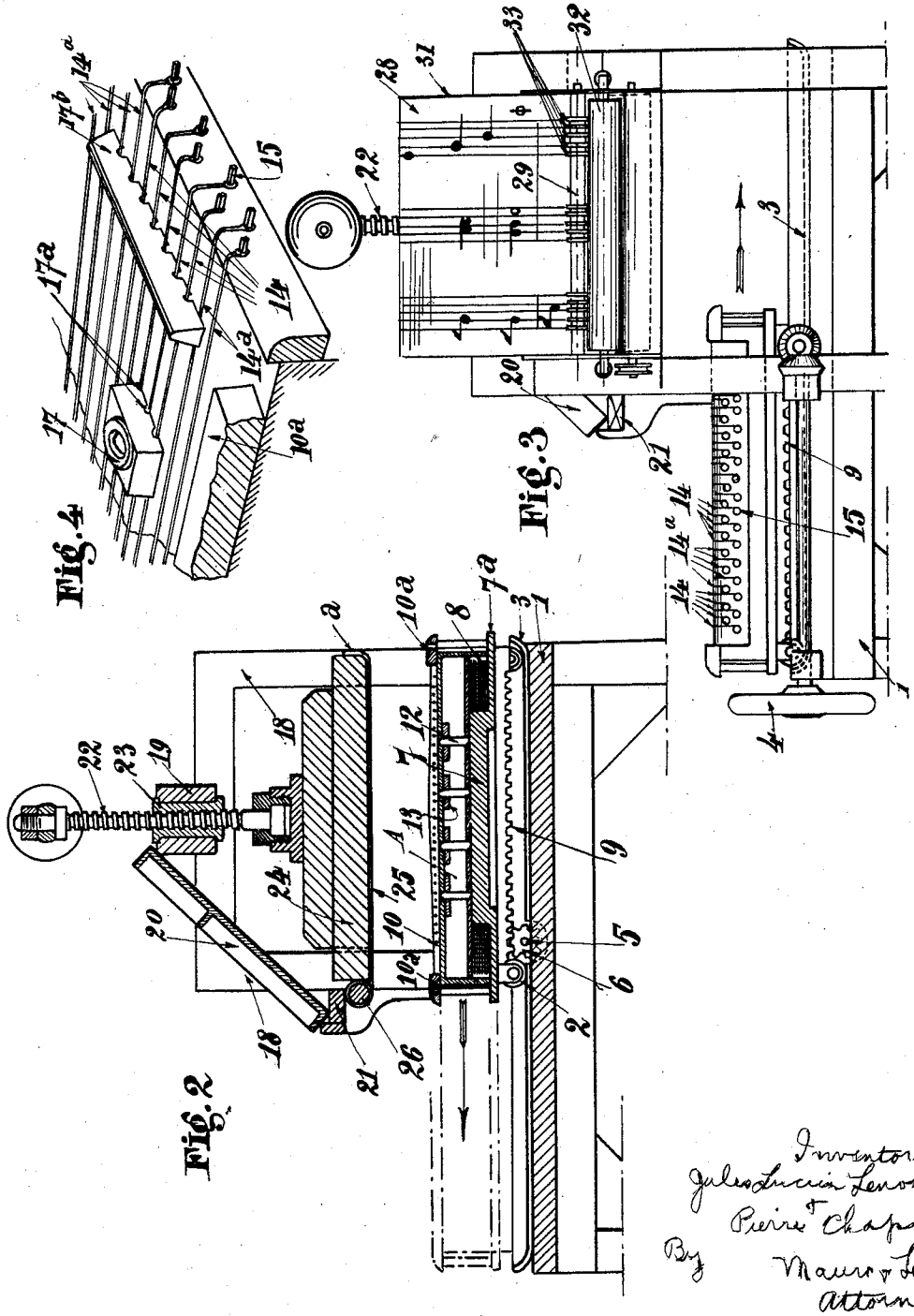


Fig. 2

Fig. 3

Fig. 4

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MACHINE FOR SETTING UP AND PRINTING MUSIC

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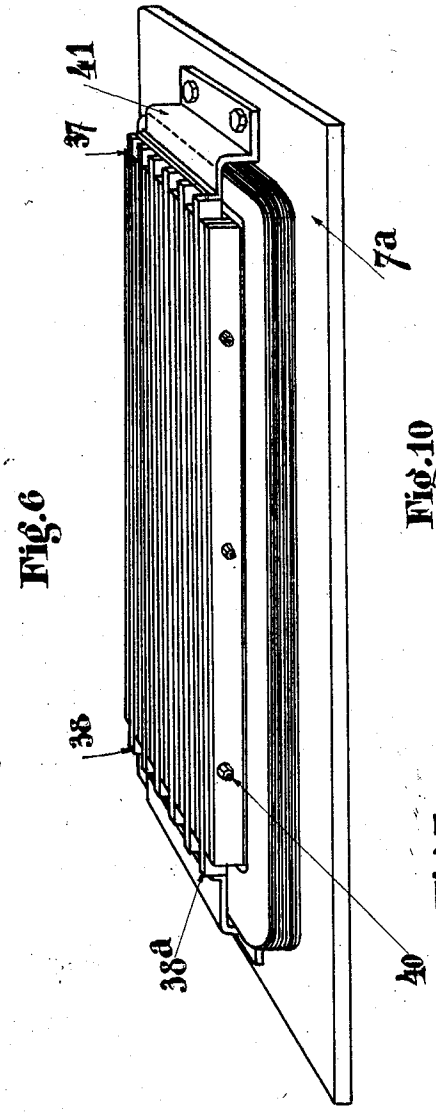


Fig.6

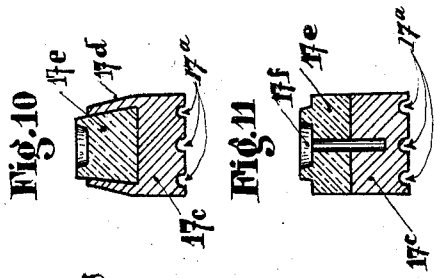


Fig.10

Fig.11

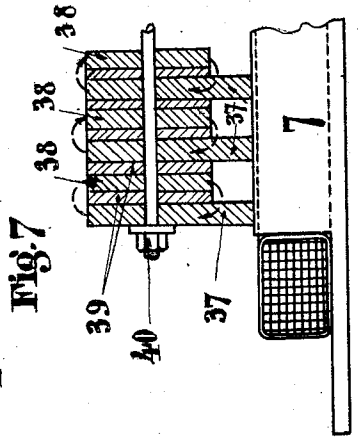


Fig.7

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MACHINE FOR SETTING UP AND PRINTING MUSIC

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Fig. 5

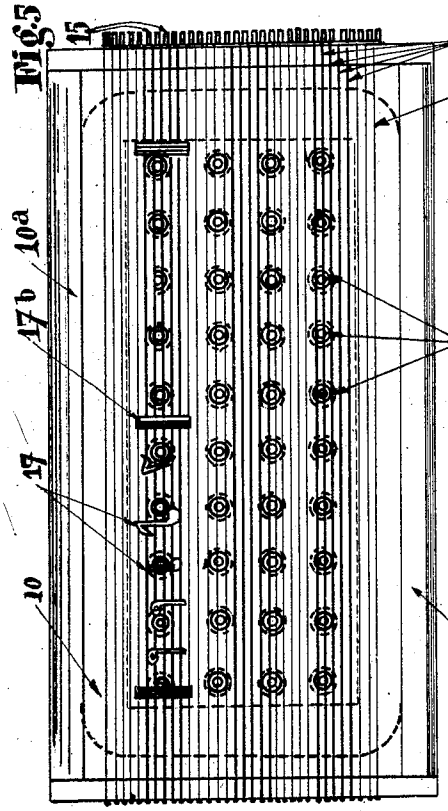


Fig. 9



Fig. 8

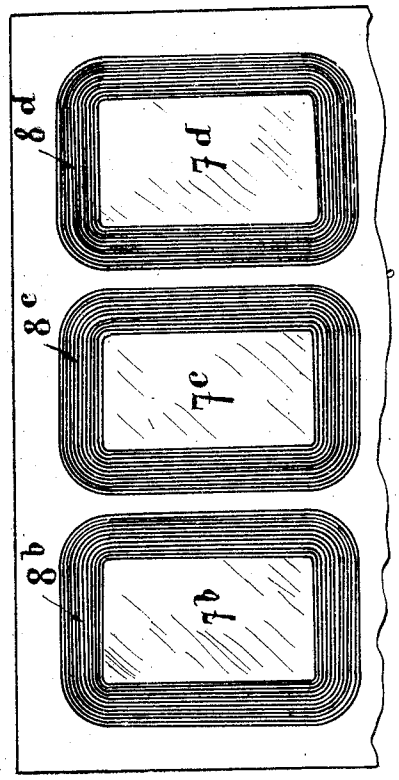


Fig. 16

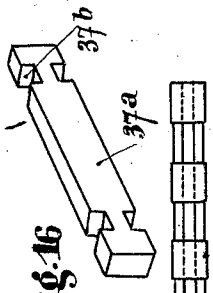


Fig. 14

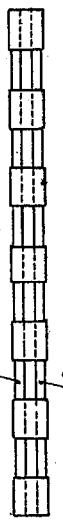


Fig. 15

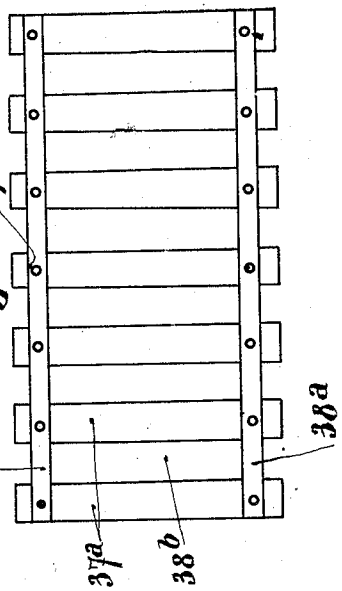


Fig. 12

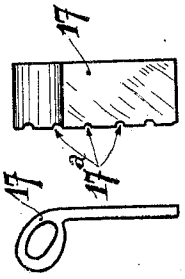


Fig. 13

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Patented Aug. 27, 1929.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR SETTING UP AND PRINTING MUSIC.

Application filed July 15, 1927, Serial No. 206,041, and in France February 25, 1927.

My invention relates to an apparatus for the typographical composition and printing of music and to a method in which the music is composed upon a magnetic or electro-magnetic table carrying lines analogous to musical staves on an enlarged scale, as well as the use of small type pieces of magnetic metal having the form of the usual characters, on the same enlarged scale as the staves. Upon the said type pieces is applied a sheet of paper carrying the musical staves corresponding to the ones formed on the table, and thus the composed music can be printed upon the sheet. From the said sheet a negative of reduced size is obtained by photography, which is reproduced by the known methods.

The said apparatus is chiefly characterized by the following features:

The printing paper travels from a feeding reel placed at one side of the magnetic table, through a pair of actuating rollers disposed at the other side of the said table. The paper can be applied upon the said table by means of a vertically movable plate, and it is then drawn forward at the end of the operation and passes over an inking roller by means of which the staves are printed upon the paper.

The electro-magnetic table is arranged to be horizontally slidable so that it may be brought from under the said printing plate and thus become disengaged during composition.

The lines upon the said table are formed by cords which are stretched from one end to the other, and the type pieces have suitable notches formed on the under side by which they may be disposed upon the said cords, so that they may be readily placed in the proper position.

The said invention further relates to the following features by way of a modified construction:

a. The composing table preferably consists of a set of bars or strips in parallel position and consisting of steel or like metal or alloy of a magnetic nature, which are disposed on the same level at the top and are spaced apart by flat members of a non-magnetic metal or alloy, the bars of the even or odd numbered series alone resting below (against) the magnetic core, while the bars of the odd or even numbered series are connected together at the ends and are placed in metallic contact with the said core by means of these ends, thus forming closed spaced magnetic circuits, and assuring the practically uniform distribution of the magnetic flux upon the table whereby the type pieces will perfectly adhere to the latter.

b. The type pieces for the notes or like characters consist of a main or bottom portion of soft steel or like magnetic metal or alloy, upon which is mounted in any suitable manner a type-metal top portion in which the note is represented in relief.

c. A felt sheet or pad is stretched upon the said pressing plate, and to assure the proper tension, one end of the felt sheet is secured to one end of the plate and the other end of the sheet is wound at the other end of the said plate upon a rod of square section which is left unfinished after casting in order to provide a rough surface, and which is held by small ratchet wheels.

d. The printed sheet after leaving the machine may be finished or corrected in any desired manner. I may for instance employ an air brush in connection with suitable stencils to form upon the said sheet all the musical characters or signs which may be necessary, such as slurs, braces, ties for quavers, or the like. Any errors in the notes or other parts are preferably corrected by pasting upon the faulty portion, a piece of paper carrying the correct notes, and this correction will be quite invisible upon the reduced photographic copy of the sheet.

Further characteristics of the invention will be obvious from the following description with reference to the accompanying drawing in which,

Fig. 1 is a general elevational view of the machine;

Fig. 2 is a section on the line A—A of Fig. 1;

Fig. 3 is an end view of the machine, with the electro-magnetic table moved to the front of the printing plate;

Fig. 4 is a partial perspective view on a larger scale showing how the type pieces are mounted;

Fig. 5 is a plan view of the table;

Fig. 6 is a modified form of the same;

Fig. 7 is a sectional detail of Fig. 6;

Fig. 8 is a plan view of a modification;

Fig. 9 is a longitudinal section through Fig. 8;

Figs. 10 and 11 are respectively sectional details of two forms of type pieces;

Fig. 12 is a front elevational view of a type piece representing a musical note;

Fig. 13 is the corresponding side view thereof;

Fig. 14 is an elevational view of a modified form of magnetic table;

Fig. 15 is the corresponding plan view thereof; and

Fig. 16 is a perspective view of a detail.

My apparatus comprises a horizontal table whose width is about twice the width of the electro-magnetic plate or type carriage A which is mounted upon the same by means of the rollers 2 adapted to travel upon the rails 3 under the action of a hand wheel 4 which drives, by means of bevel gearing, a shaft 5 to which are keyed the pinions 6 coacting with the racks 9.

The magnetic table A consists of a cast iron plate 7 of rectangular form surrounded by a flanged portion 7^a of flat shape upon which is disposed the coil of conducting wire 8. The said coil carries a current which is preferably regulated by a rheostat (not shown) thus energizing the whole surface of the plate 7 forming the core of the electro-magnet. Above the plate 7 is disposed a steel plate 10 into which are inserted, according to a set of longitudinal lines corresponding to the lines of the musical stave, the steel pole-pieces 12 which are flush with the upper surface of said plate and are separated therefrom by a bushing 13 of a non-magnetic metal or alloy such as aluminium, the said pole pieces serving to transmit the magnetic flux from one plate to the other. The disposition of the said pole-pieces may be as desired, and their number should be as large as possible in order to obtain the best distribution of the magnetic flux upon the said table.

Across the said table are stretched from one end to the other various sets of cords 14 in parallel position which are optionally metallic, the ends of the cords being wound upon the stretching pegs 15. Each set of cords comprises a series of five cords 14 corresponding to five lines of the staff. Between the staves are disposed other cords 14^a of a different color for marking in the proper manner the position of the type pieces corresponding to the notes between the lines.

The type pieces 17 (Figs. 12 and 13) are made of magnetic metal, and consist of a block carrying the musical note or like character in relief. On the under side of the piece are formed the notches 17^a which are adapted to fit upon the cords 14. The figure shows a half note by way of example, but it is obvious that all characters can be formed in like manner. Certain of the notes, such as the quavers for instance, may be formed, by juxtaposing several parts in order to limit the numbers of type pieces. The bars of the music are formed by placing upon the table at the proper intervals the straight pieces 17^b having the same height as the type pieces 17.

At the sides of the table A are disposed the flat bars 10^a having the same height or thickness as the type pieces 17, and the said bars serve to limit the descent of the platen hereinafter described more in detail thus preventing any damage to the type pieces.

Above the main table or base 1 is disposed, over one-half the width thereof, a frame comprising two vertical uprights 18 and a horizontal cross-piece 19, which supports the type box 20 which also rests upon a cross-piece 21 connecting the said uprights. The said type box contains the different pieces of type for composing the music. A screw 22 provided with weighted arms is engaged in a nut 23 mounted on the cross-piece 19 and it controls the upward and downward motion of a platen 24 which is vertically slidable between the uprights 18. The said platen has the same width as the table A, and its lower side is faced with a felt member 25 which is secured at one end a to one side of the platen while its other end is wound upon a square shaft 26, held by the pawls 16, whereby the said felt member may be more or less stretched.

On one side of the said frame is disposed, upon a suitable support, a roll of paper 27 which has the same width as the table A. The paper band 28 travels over the whole length of the table and is engaged between two drums 29—30 mounted at the other end of the frame. The drum 30 may be rotated as desired by a suitable mechanism, and the paper band is finally wound upon a reel 31. Two pairs of rollers 28^a at each end are employed to hold the paper and to stretch it below the plate, and the said rollers are pressed together by means of an eccentric.

Upon the cylinder 29 are formed sets of five annular projecting parts or flanges 33 with sharp edges which make contact with the paper wound on the drum 30. Said flanges are also in contact with the inking rollers 32—34 which operate in an ink vessel 35, and the said rollers thus print upon the paper various parallel lines corresponding to the musical staves.

The operation of the said apparatus is as follows:—

To set up the music, the hand wheel 4 is

used to bring the type-carriage A as near as possible to the front edge of the table 1, and the magnetic flux is so regulated as to produce only a slight adhesion of the type pieces, so that they may be readily put in place. The music may be set up even without energizing the electromagnet, and the type 17 and the bars 17^b will remain in place upon the table. The work is set up as above mentioned by placing the type 17 and the bars 17^b upon the cords 14 which form lines of the stave. When the piece of work has been completed, the strength of the current, and hence the adhesion of the type, is increased. The type is inked, and the type-carriage A is brought below the platen 24. The paper band 28 being engaged between the rollers 28^a is stretched thereby and the platen 24 is lowered by means of the screw 22. Due to the use of the felt pad 25 and the slight amount of slack resulting from the free unwinding of the reel 27, the notes will be printed instantaneously in a perfect manner. The platen 24 is then raised, and the rollers 29 and 34 are rotated so as to draw forward the paper a distance equal to the printing thereon, and the flanges 33 then print the lines of the stave as the paper travels forward.

The printed band of paper is then cut off and the electric circuit is broken in order to remove the type 17 which are employed for other pieces of work.

To obtain a better distribution of the magnetic flux upon the table or type carriage A, it may be constructed as shown in Figs. 6 and 7. As therein shown the table consists of rectangular bars 37, 38 of soft steel or of a like magnetic metal or alloy which are spaced apart by the bars 39 of a non-magnetic metal or alloy such as brass or bronze, the set of bars being pressed together by bolts 40 of a non-magnetic metal.

The bars 37 are wider than the bars 38 and will thus rest directly upon the core 7 of the table, as shown in Fig. 7. The bars 38 extend outwardly at their ends 38^a (Fig. 6) and are connected together by a cross-piece which is placed in metallic contact with the flanged part 7^a of the core 7, for instance, by the angle piece 41.

Under these conditions the magnetic circuits are very numerous, and are closed as indicated by the arrows in Fig. 7. The magnetic fluxes traverse the type pieces 17 which are placed on the surface of the table so that the said type will adhere to the table properly.

By making bars 37—38—39 very thin, I may obtain magnetic circuits which lie very close together, so that the magnetic field is uniformly distributed over the surface of the type carriage.

Obviously, the arrangement of the bars 37—38—39 may be modified, and the bars may have an oblique or transverse position, or any other suitable arrangements may be employed.

The plate may be composed of the bars 37^a, as shown diagrammatically in the end view Fig. 14 and in the plan view Fig. 15. Said bars are made of a non-magnetic metal, of small cross section, and are connected together in any suitable manner, for instance at both ends and at the top and bottom by rods of a non-magnetic metal 38^a which are inserted into the notches 37^b in the said bars, as shown in perspective in the detail view Fig. 16, thus leaving a space 38^b between the bars which may optionally be filled with brass strips, plaster, clay or the like. I prefer to place the said bars parallel with the smaller sides of the electric coil.

In the construction which is shown in Figs. 8 and 9, the core consists of several parts, three for instance, 7^b 7^c 7^d, each of which is surrounded by a respective coil 8^b 8^c 8^d. The said core may be combined with a set of pole-pieces as shown in Fig. 2, or with a table comprising juxtaposed bars as shown in Figs. 8 and 9, or parallel bars as shown in Fig. 14.

The type pieces 17 preferably consist of one piece of cast or drawn steel, but they may be made in two parts, as shown in Figs. 10 and 11, and thus include a main portion 17^c of magnetic metal provided with flanges 17^d between which I insert a metal of any suitable nature such as a type metal 17^e, the same being held in place by slightly upsetting the flanges 17^d.

In the modification shown in Fig. 11, the piece of type metal 17^e is secured to the main body of soft steel by one or more pins 17^f which are fitted friction tight.

One advantage which is obtained with my said apparatus resides in the fact that the work may be corrected in a very simple manner, for in the known methods of music printing it is a long and complicated matter to make such corrections. On the large-sized printed sheet obtained from the machine I may make all desired corrections by pasting upon any faulty notes or like characters, suitable pieces of paper containing the correct characters, and since the sheet is photographed on a reduced scale, such corrections will be quite invisible.

When the sheet is removed from the printing machine, certain signs or parts may be lacking, such as slurs, braces, ties or quavers, or the like, which are difficult to form in type by reason of their variable size, so that these will be wanting in the printed sheet. These corrections may be readily made on the sheet after leaving the press, by the use of an air brush and suitable stencils.

The apparatus permits of setting up pieces of music together with the words, or of printing or otherwise forming the words by

a separate process and then pasting the same upon the sheet of music before it is photographed.

Obviously, the said invention is not limited to the form of construction hereinbefore disclosed, which is given solely by way of example, but many modifications may be made without departing from the spirit of my invention as comprehended within the cope of the appended claims.

What I claim is:—

1. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, means on said type carriage for retaining musical characters thereon in a position corresponding exactly to the standard musical staff, means for displacing a strip of paper between said platen and carriage and means associated with said last mentioned means for printing the staff lines on said paper after the desired musical characters have been impressed on said paper.

2. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, means on said type carriage for retaining musical characters thereon in a position corresponding exactly to the standard musical staff, means for displacing a strip of paper between said platen and carriage and rotary means associated with said last mentioned means for printing the staff lines continuously as said paper is displaced but subsequent to the printing of the desired musical characters thereon.

3. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table corresponding to the standard musical staff for guiding the musical type characters disposed on said table, means for displacing a strip of paper between said platen and said table and means associated with said last mentioned means for printing staff lines upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

4. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table corresponding to the standard musical staff for guiding the musical type characters disposed on said table, means for displacing a strip of paper between said platen and said table and rotary means associated with said last mentioned means for printing staff lines continuously upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

5. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, means on said type carriage for retaining musical characters thereon in a position corresponding exactly to the standard musical staff, means for displacing a strip of paper between said platen and carriage, a rotary printing roller associated with said paper at a point beyond where the said characters are impressed thereupon, and a plurality of knife edge annular flanges on said printing roller disposed in line with said first mentioned means for the purpose disclosed.

6. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table corresponding to the standard musical staff for guiding the musical type characters disposed on said table, means for displacing a strip of paper between said platen and said table, a rotary printing roller associated with said paper at a point beyond where the said characters are impressed thereupon, and a plurality of knife edge annular flanges on said printing roller disposed in line with said first mentioned means for the purpose disclosed.

7. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table for guiding the musical type characters disposed on said table, means for regulating the tension of said cords, means for adjusting the interval between any five consecutive cords simultaneously whereby two staffs of music of different size may be simultaneously produced, means for displacing a strip of paper between said platen and said table and means associated with said last mentioned means for printing staff lines upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

8. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table for guiding the musical type characters disposed on said table, means for regulating the tension of said cords, means

for adjusting the interval between any five consecutive cords simultaneously whereby two staffs of music of different size may be simultaneously produced, means for displacing a strip of paper between said platen and said table and rotary means associated with said last mentioned means for printing staff lines continuously upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

9. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table for guiding the musical type characters disposed on said table, rotatable pins for regulating the tension in said cords, a notched bar having notches corresponding to the interval between the lines of the staff which it is desired to reproduce whereby two staffs of music of different size may be simultaneously produced, means for displacing a strip of paper between said platen and said table and means associated with said last mentioned means for printing staff lines upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

10. In a device for printing music, the combination of a vertically displaceable platen, a horizontally displaceable type carriage beneath said platen, a magnetic type table mounted on said carriage, a plurality of equally spaced flexible cords stretched across said type table for guiding the musical type characters disposed on said table, rotatable pins for regulating the tension in said cords, a notched bar having notches corresponding to the interval between the lines of the staff which it is desired to reproduce whereby two staffs of music of different size may be simultaneously produced, means for displacing a strip of paper between said platen and said table and rotary means associated with said last mentioned means for printing staff lines continuously upon said paper coinciding exactly with said cords after the desired musical characters have been impressed on said paper.

11. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core and a plurality of laminated plates of magnetic and non-magnetic material of different widths having their upper edges disposed in flush relation carried by said core for the purpose disclosed.

12. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of strips of magnetic material, a strip of non-magnetic material of the same width disposed on each side of each of said first mentioned strips, and a plurality of strips of magnetic material separating said first mentioned magnetic strips of relatively larger width engaging said core on their lower edge, all of said strips having their upper edges disposed in flush relation for the purpose disclosed.

13. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of laminated plates of magnetic and non-magnetic material of different widths and different lengths having their upper edges disposed in flush relation carried by said core and a magnetic yoke associated with each end of the longer strips for the purpose disclosed.

14. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of strips of magnetic material, a strip of non-magnetic material of the same width disposed on each side of each of said first mentioned strips, a plurality of strips of magnetic material separating said first mentioned magnetic strips of relatively larger width and longer length engaging said core on their lower edge, all of said strips having their upper edges disposed in flush relation and a magnetic yoke associated with each end of the longer strips for the purpose disclosed.

15. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of strips of magnetic material, a strip of non-magnetic material of the same width disposed on each side of each of said first mentioned strips, a plurality of strips of magnetic material separating said first mentioned magnetic strips of relatively larger width engaging said core on their lower edge, all of said strips having their upper edges disposed in flush relation, a plurality of flexible cords disposed above said plates, means for adjusting the tension of said cords and means for regulating the interval included between any five cords simultaneously for the purpose disclosed.

16. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of laminated plates of magnetic and non-magnetic material of different widths having their upper edges disposed in flush relation carried by said core, a plurality of flexible cords disposed

above said plates, means for adjusting the tension of said cords and means for regulating the interval included between any five cords simultaneously for the purpose disclosed.

17. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of laminated plates of magnetic and non-magnetic material of different widths and different lengths having their upper edges disposed in flush relation carried by said core, a magnetic yoke associated with each end of the longer strips, a plurality of flexible cords disposed above said plates, means for adjusting the tension of said cords and means for regulating the interval included between any five cords simultaneously for the purpose disclosed.

18. In a machine for printing music, a magnetic type receiving table comprising, in combination, an iron plate, a centrally disposed core on said plate, a winding disposed on said core, a plurality of strips of magnetic material, a strip of non-magnetic material of the same width disposed on each side of each of said first mentioned strips, a plurality of strips of magnetic material separating said first mentioned magnetic strips of relatively larger width and longer length engaging said core on their lower edge, all of said strips having their upper edges disposed in flush relation, a magnetic yoke associated with each end of the longer strips, a plurality of flexible cords disposed above said plates, means for adjusting the tension of said cords and means for regulating the interval included between any five cords simultaneously for the purpose disclosed.

In testimony whereof we have signed this specification.

JULES LUCIEN LENOUVEL.
PIERRE CHAPSAL.