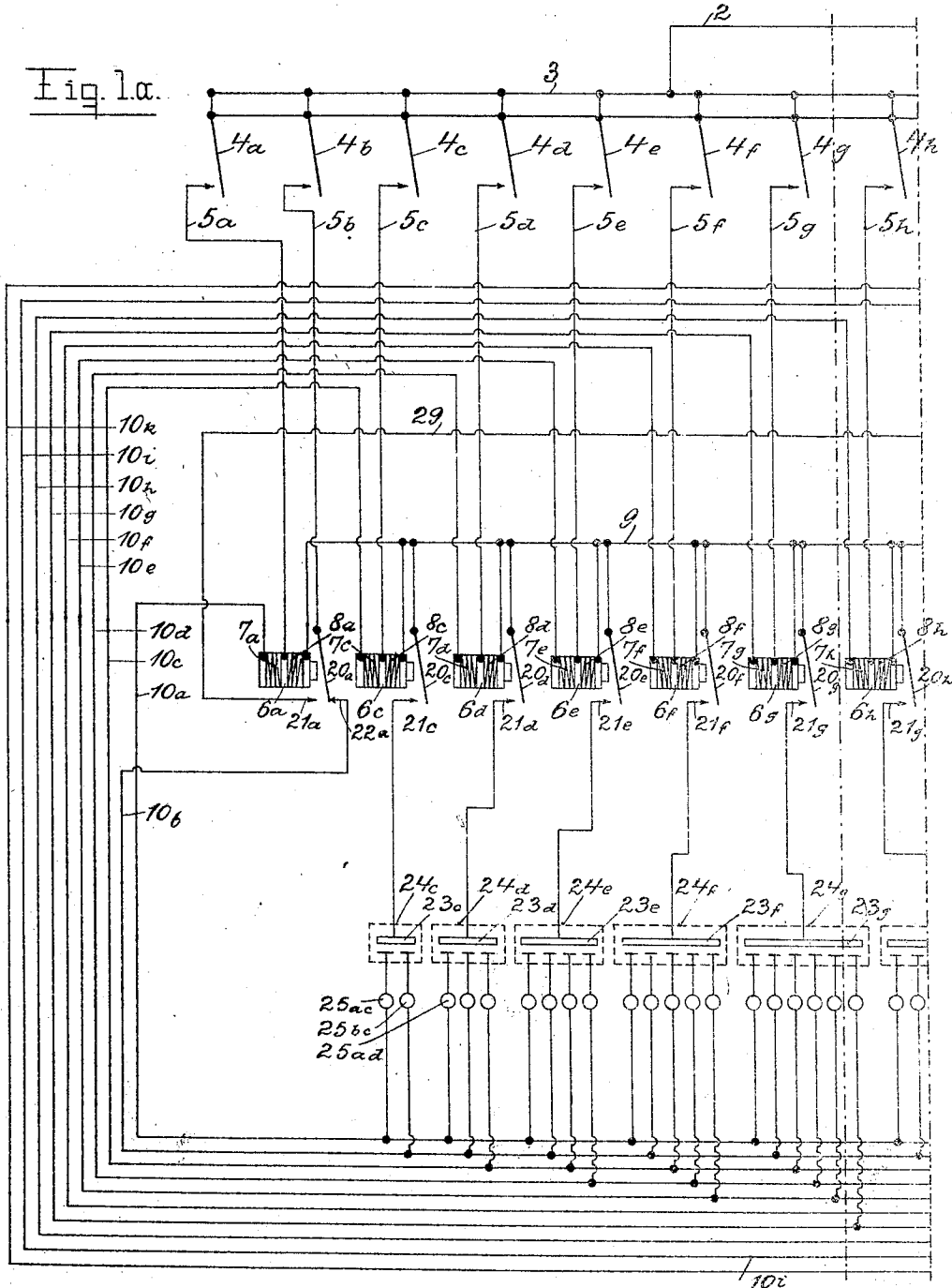


H. DREWELL.
TYPE SETTING DEVICE.
APPLICATION FILED DEC. 9, 1908.

1,026,243.

Patented May 14, 1912.

5 SHEETS-SHEET 1.



WITNESSES

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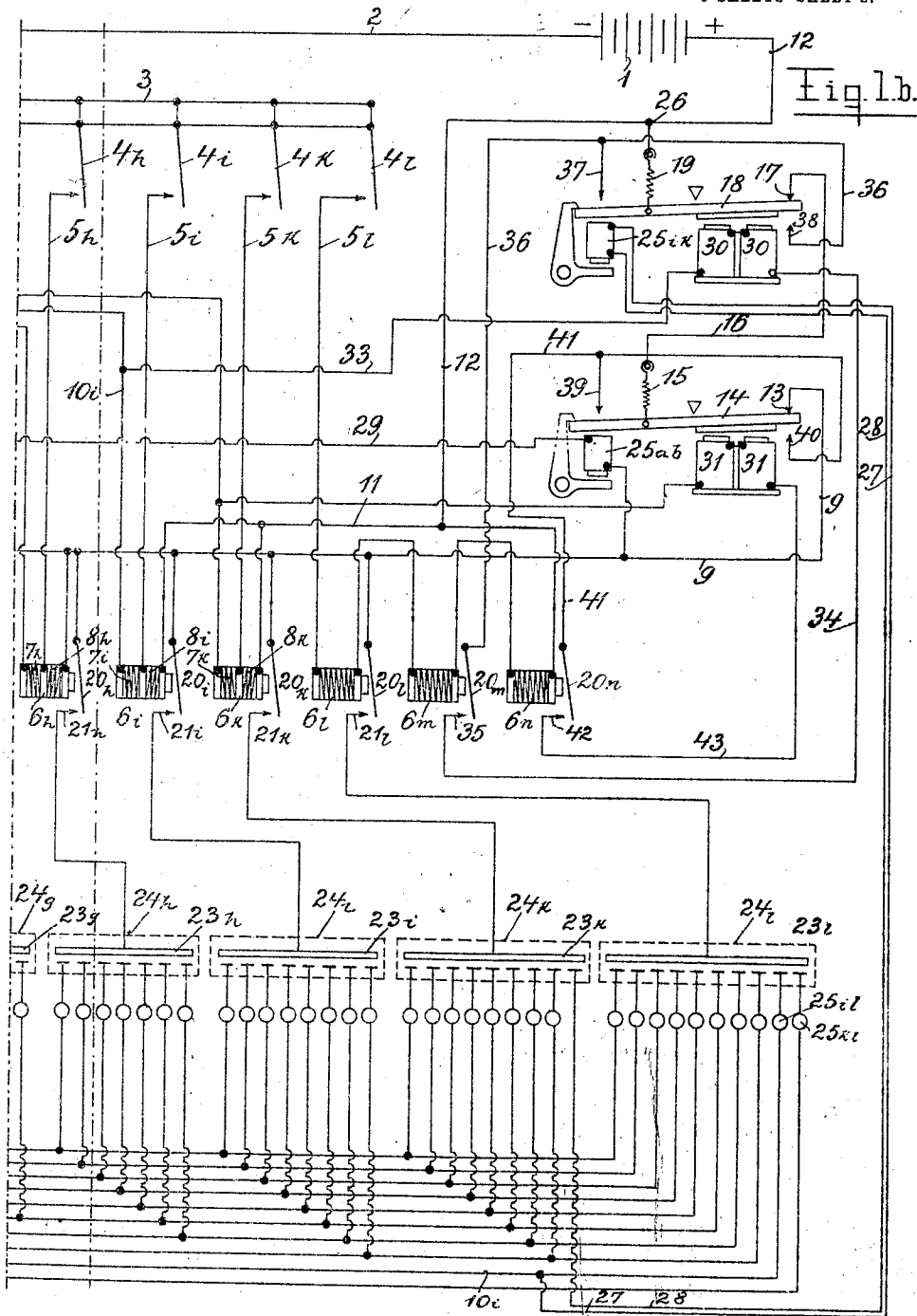
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

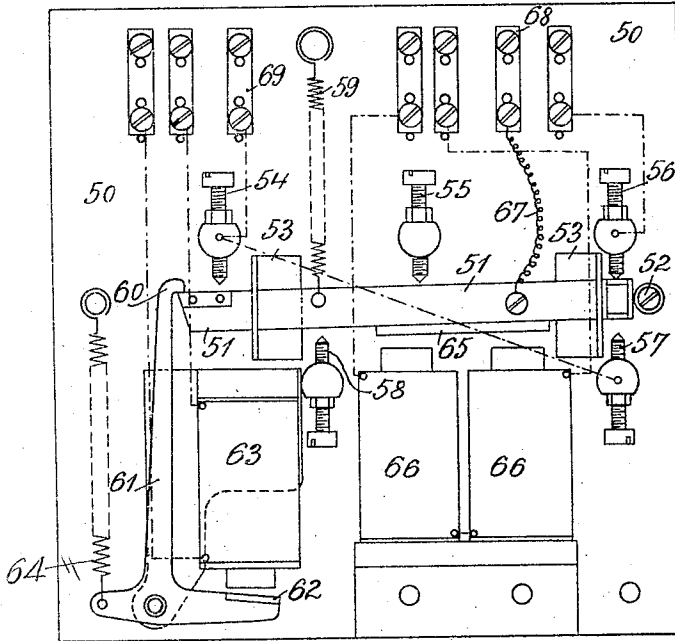


Fig. 2.

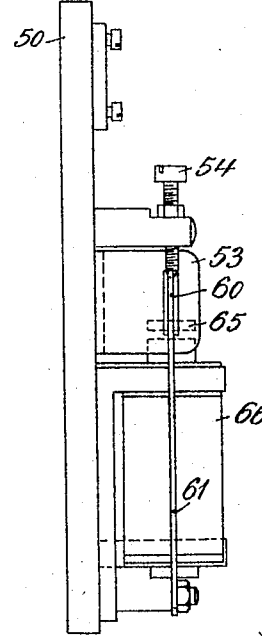


Fig. 3.

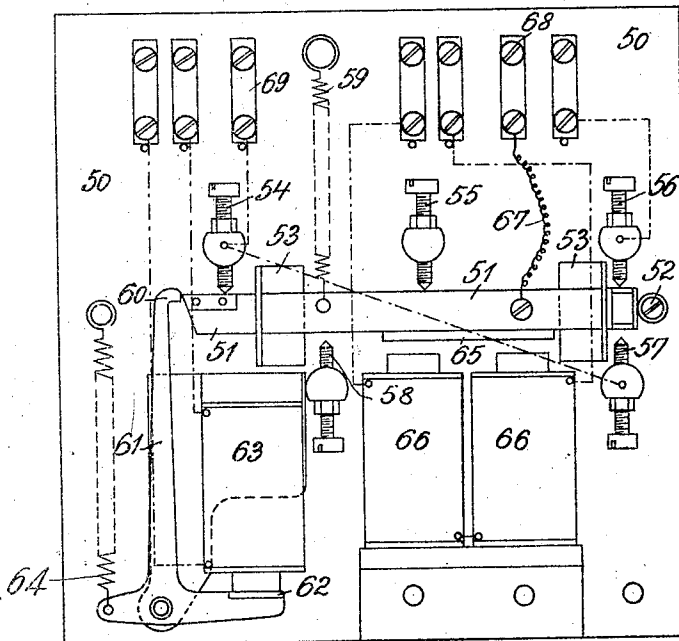


Fig. 4.

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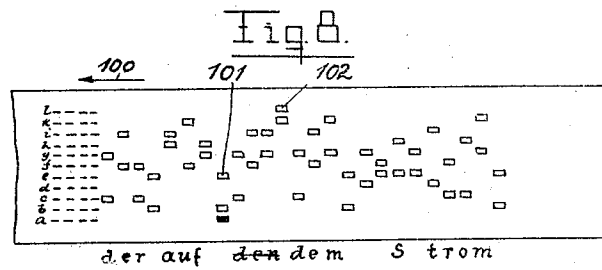
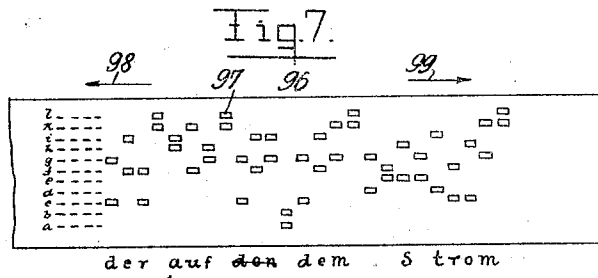
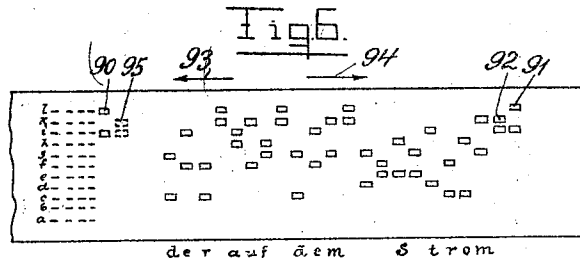
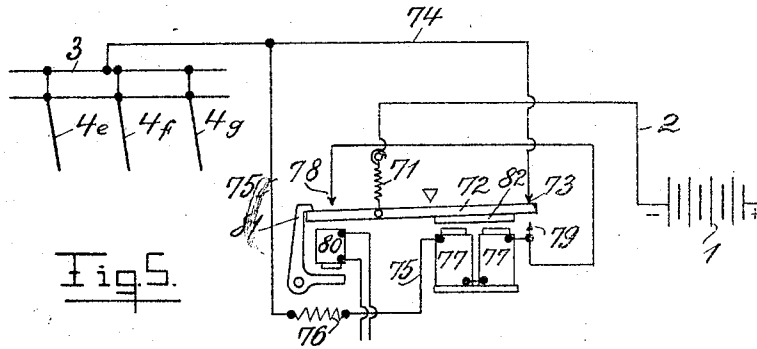
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Patented May 14, 1912.

5 SHEETS-SHEET 4.

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H. DREWELL.
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5 SHEETS—SHEET 5.

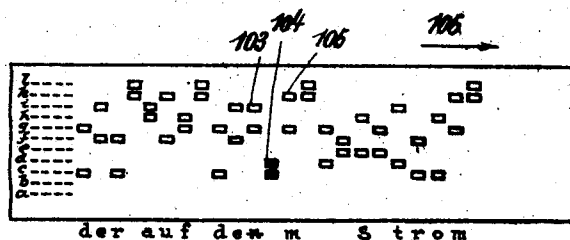


Fig. 9.

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UNITED STATES PATENT OFFICE

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TYPE-SETTING DEVICE

1,026,243.

Specification of Letters Patent

Patented May 14, 1912.

Application filed December 9, 1908. Serial No. 466,796.

To all whom it may concern:

Be it known that I, HEINRICH DREWELL, a subject of the German Emperor, residing at Charlottenburg, near Berlin, Germany, have invented new and useful Improvements in Type-Setting Devices, of which the following is a specification.

The subject-matter of the present invention is a device, the object of which is to cause defective places of a perforated band used for automatic type setting to become inoperative. Whereas type-setting machines were originally worked by means of a perforated band only in order to make it possible to justify the lines, this mode of working is now employed in order to simplify the operation of type setting, so that operating a typewriter is sufficient for making or preparing composition ready for printing. The circumstances that errors occur when writing or type setting has to be particularly taken into consideration, because the composer is not in the position to remove a mistake which has been made by erasing the written matter. Pasting up holes in the perforated band or similar methods occupy too much time. Therefore means have already been provided by means of which a symbol is perforated in the band by striking a key, by means of which symbol a row of previously perforated symbols can be made inoperative. Their action, however, was heretofore but limited and not adapted to the requirements of type setting. For these it is of special value to be able to improve the work which has been done in as varied a manner as possible. It must be taken into consideration that a typist or composer who works at the keyboard of a typewriter or type-setting machine as a rule very soon notices errors which have occurred, generally before or when finishing the concerned word which has been incorrectly set. Further, it frequently happens that the composer cannot know with certainty whether a syllable can or can not be placed in the almost completed line. If he attempts in such a case to place into the line a syllable which in fact cannot fit into the line, with the means known heretofore he must then cancel the entire line and typewrite or compose it again. The present invention provides for both cases by

only the last word being canceled without the previous words of the same line requiring to be typed again. For special cases the possibility is also provided of making whole lines inoperative. This is of value when the composer notices at the end of a composed or typed line that the distribution of spaces within the line does not admit of it being justified, or when for other reasons he does not wish the entire line to appear in the composition. Lastly, errors are easily possible when manipulating those keys or devices which are not used for type setting, but serve for performing other functions in the type-setting machine. To these mistakes belong, for example, changing over to another sort of type, justifying lines, or the like. For these events the composer must be given the possibility of making one single perforated symbol inoperative. The groups of holes on the perforated band which are to be made inoperative, or more briefly, canceled, as will be said hereafter for the sake of brevity, represent therefore either individual symbols, commenced words or commenced lines. Also under certain circumstances, however, they may relate to optional sections of the composition.

It is non-essential whether the lines are filled up or the words written out or entirely composed. The essence of the invention is rather in determining the limits of the parts to be canceled by means of the different canceling symbols. For this purpose a plurality of canceling and inserting symbols are provided and so arranged with regard to one another that after the action of the holes in the band has been canceled by one definite canceling symbol, the action can only be re-inserted or come into play again by means of that inserting symbol which corresponds to the canceling symbol which has been operative, whereas the remaining inserting symbols can exercise no action. Consequently the different canceling and inserting symbols do not mutually disturb one another.

If, as in the present case, whole lines and single words are to be able to be canceled, two canceling symbols are provided, with which two inserting symbols correspond. As inserting symbols, those combinations of holes can serve particularly which have to

fulfil another duty when the type-setting machine is being normally operated. However, the action of these perforated symbols must be so changed by the appertaining canceling symbol that the operation of the band comes into play again instead of the normal action of the concerned symbol. In the present invention the canceling symbol itself in the first place is provided as the inserting symbol after the cancellation of a line. When words are canceled two possibilities have to be taken into consideration. If the perforated band is introduced into the type-setting machine with the symbol which was last perforated first, it then runs backward in it, and the symbol for the space between two words can serve for switching in again the operation of the band after a word has been canceled. If the register band runs in the type-setting machine in the same direction, on the contrary, as that in which it was made in the perforating machine, a different combination of holes from the symbol for the space between two words, must be used for inserting or switching in the operation of the band.

In order that the invention may be clearly understood, reference will be made to the accompanying drawings in which some embodiments are represented diagrammatically by way of example, and in which:

Figures 1^a and 1^b are diagrams of connections showing switching devices, for canceling groups of holes for words and also for whole lines, connected with known means containing electromagnets which are selected by means of electric currents distributed by a perforated band and used for automatically operating type-setting machines; Fig. 2 is an elevation of the switching device according to the invention in one position, Fig. 3 a vertical side view of the same, and Fig. 4 a vertical elevation of the same in another position; Fig. 5 shows another manner in which the switching device shown in Figs. 2 to 4 can be connected with the known means shown in Fig. 1, whereas Figs. 6, 7, 8 and 9 are portions of a register band having various symbols punched in the same.

At present it will be supposed that the band runs in the type-setting machine in the direction opposite to that in which it ran when being made. In the representations of portions of a register band shown in Figs. 6 to 9 in the accompanying drawing, the eleven different positions of holes which are here provided are denoted by the letters *a* to *l*. All the perforated symbols consist of two holes each and are denoted hereinafter with the two letters which correspond to the concerned positions of the holes. For example a symbol *a b* consists of one symbol in the position *a* and another symbol in the position *b* arranged on the band transversely.

In the present case two symbols are provided for canceling, namely the symbol *a b* for canceling a group of holes which corresponds to a word, and the symbol *i k* for canceling a group of holes which corresponds to a line. The choice of these symbols is arbitrary, however, and is not occasioned by the essence of the invention. Besides the two given instances of different ways in which cancellation may be effected, a third possibility is given in addition when it is wished to cancel individual letters. In this case one optional perforated symbol can likewise be used, but this must be different from the other two however. This mode of cancellation will be dealt with more particularly hereafter.

In the constructional form which is here described by way of example it is supposed that the type-setting machine is operated by the register band by means of known means for distributing the current. These means are represented diagrammatically in Figs. 1^a and 1^b of the accompanying drawings. The denominations selected in this figure are such that like members are denoted with the same numerals and are distinguished from one another by means of an index. The latter corresponds to the holes *a* to *l* of the perforated band, by which holes the concerned member is influenced indirectly or directly. Accordingly all the parts of the means, which, for example, are dependent on one hole in the position *a*, are provided with the index *a*. The parts which are influenced by a hole in the position *b* have the index *b*, and so on. Those means which only come into operation when two holes of the register band act simultaneously and which are thus dependent on these two holes, namely the electromagnets for the characters, have accordingly besides the common reference numeral an index which consists of two letters. By means of these eleven positions of holes 55 different perforated symbols each having two holes can be represented. If more than 55 different characters are to be set, a change-over device can be operated in known manner by corresponding symbols of the band. Each hole of the band acts on a feeling lever which forms an electric switch. The two holes of a symbol act simultaneously.

From the negative pole of a source of current 1 a conductor 2 goes to a conductor 3 which is connected with all the feeling levers 4_a to 4_l. The feeling levers 4_a, 4_b, 4_c, and so on to 4_l, correspond to the positions of the holes *a* to *l* on the register band. These are denoted in the Figs. 6 to 8 by *a*, *b*, *c* and so on to *l*. Each of the feeling levers closes a contact when a hole of the register band passes the lever. From the contacts opposite the feeling levers there go conductors 5_a, and so on to 5_l, to coils 6_a, and so on to 6_l.

so on to 6_i. With the coil 6_i there are connected in series two other coils 6_m and 6_n which operate simultaneously with coil 6_i. The coils 6_a, 6_c, to 6_k have each two windings 7_a, 7_c, to 7_k and 8_a, 8_c, to 8_k. The free ends of the windings 8_a, 8_c to 8_k are connected with a common conductor 9. The free ends of the coils 7_a, 7_c to 7_k are connected with conductors 10_a, 10_c to 10_k. The coils 8_i, 8_k and the free ends of the coil 6_n are connected with a conductor 11, from which a conductor 12 leads to the positive pole of the battery 1. The conductor 9 is likewise connected with the positive pole of the battery 1 in the following circuit: contact 13, lever 14 of a switching device, spring 15, conductor 16, a second contact 17, lever 18 of a second switching device, spring 19, conductor 12 and positive pole of the source of current 1.

The conductor 5_b does not go to the coil of a switch but to the switch lever 20_a which is actuated by the electromagnet 6_a. The lever 20_a has two contacts 21_a and 22_a. The latter is the rest contact, against which the lever lies when the magnet is not energized. From the contact 22_a a conductor 10_b goes to the other parts of the apparatus. Consequently the conductor 5_b is connected with the conductor 10_b when the electromagnet 6_a is not energized. Opposite the electromagnets 6_a to 6_k there are likewise switch levers 20_c to 20_n. These levers have no rest contacts but only working contacts which are only contacted by them when the appertaining electromagnets are energized. The working contacts 21_c to 21_n lead to the electrodes of valve-cells 24_c to 24_n which allow an electric current to pass in one direction only.

There are nine valve-cells 24_c to 24_n provided which have a different number of electrodes. In the valve-cell 24_c two small electrodes represented by dashes are opposite one large electrode 23_c. In the valve-cell 24_d the number of the small electrodes amounts to three, in the valve-cell 24_e to four, and so on. In the last valve-cell 24_n ten small electrodes are opposite the common large electrode 23_n. The small electrodes of the valve-cell 24_c to 24_n are each connected with an electromagnet 25_{ac} to 25_{ni}. These electromagnets are the so-called character electromagnets of the type-setting machine, the principal duty of which is to release the types, whether letters or matrices, but some of these electromagnets, however, are also used for controlling other functions of the type-setting machine. For the sake of brevity these electromagnets are herein-after called "character electromagnets." By "character electromagnets 25," without an index, all the character electromagnets are to be understood each time, whereas one single character electromagnet is always denoted by the number 25 and an index. Their

two letters correspond to the two holes of the perforated band by which the concerned character electromagnet is operated.

The manner in which the above described means represented in Figs. 1^a and 1^b operates is known. A character electro-magnet 25 is selected by a perforated symbol of the band consisting of two holes. Each of these holes acts directly or indirectly on one of the feeling levers 4_a to 4_i which is thereby closed. If the character electromagnet 25_{ac}, for example, is to be energized, a perforated symbol *a c* must act on the switches 4_a and 4_c. A current then flows across switch 4_c, through conductor 5_c, coil 8_c, conductor 9 and from here to the positive pole of the source of current 1. The current in the coil 8_c energizes the electromagnet 6_c and closes the switch lever 20_c. Consequently a current now flows across switch 4_a, conductor 5_a, coil 7_a, conductor 10_a, character electromagnet 25_{ac}, valve-cell 24_c, contact 21_c, lever 20_c, conductor 9, and to the source of current 1.

The valve-cells 24_c to 24_n are for doing away with unintentional shunt connections in known manner by their stopping those currents which flow in a direction other than the normal direction. As these currents are not stopped at once, however, as a further safeguard duplicate windings 7_a, 8_a, 7_c, 8_c, and so on, are arranged on the electromagnets 6_a, 6_c, to 6_k. These windings make the rushes of current from the valve-cells in the opposite direction inoperative in known manner.

Now with the above described switching means there are connected additional devices for temporarily interrupting the operation of the switching means by opening the main circuit by means of suitable perforated symbols of the perforated band. The mechanical construction of these devices is represented more particularly in Figs. 2 to 4. The parts of the device are attached to a base plate 50. The principal part is a switch lever 51 which is guided in the slots of two guides 53 as clearly shown in Figs. 2 and 3. It has no fixed pivot but rotates around different fixed stops when it is switched in and out of circuit. Above the bar 51 there are arranged three set-screws 54, 55 and 56, of which the screws 54 and 56 are formed as contacts. Below the bar or lever 51 there are arranged two set-screws 57 and 58. The former is likewise a contact and is electrically connected with the screw 54. The screws 55 and 58 are only used as stops or set-screws. About in the center between the screws 54 and 55 a spring 59 is attached to the lever 51 and tends to pull it upward. Now as long as the lever 51 can freely follow the pull of the spring 59 it lies against the screws 54 and 55 without contacting the screw 56, since the point of

the latter screw is situated above a straight line passing through the points of the screws 54 and 55. At its left-hand end the lever 51 is shaped like a blade and is opposite a catch or hook 60. At the right-hand end of the lever 51 there is arranged a stop 52 which prevents the lever being moved to the right. When the lever is in the switched in position shown in Fig. 2, the catch 60 engages the left-hand end of the lever and holds the lever. The lever then contacts the screw 56 but not the screws 54 and 55. The catch 60 is on the vertical arm of a bell-crank lever 61, on the horizontal arm of which is attached the armature 62 of an electromagnet 63. A spring 64 tends to remove the armature 62 from its electromagnet and to bring the catch 60 onto the end of the lever 51. On the lower edge of the bar 51 there is attached the armature 65 of a second electromagnet 66. The set-screws 57 and 58 are so adjusted that when the armature 65 is attracted by the electromagnet 66, the armature cannot lie firmly against the magnet, but is kept away at a certain distance in order to prevent the armature remaining stuck in consequence of residual magnetism.

The electromagnet 63 serves for switching off the current and the electromagnet 66 for switching it on. The lever 51 is connected by a flexible conductor 67 with a terminal 68. Current may be conducted to the lever 51, however, without the flexible conductor 67, but with the aid of the spring 59. This latter mode of supply has been supposed in Fig. 1 for the sake of clearness. The switch is switched into its off position by the electromagnet 63 which attracts its armature 62 and withdraws the catch 60 from the left-hand end of the lever 51 by means of the bell-crank lever 61. The lever 51 then rotates around the point of the screw 55 in consequence of the tension of the spring 59, and the left-hand end of the lever lies against the stop 54. The right-hand end leaves the screw 56 and interrupts the main circuit without at present contacting the screw 57 as clearly shown in Fig. 4. With the interruption of the main circuit at the contact screw 56 the action of the electromagnet 63 simultaneously ceases. The main circuit cannot, however, be closed again because the left-hand end of the lever 51 is so high that the catch 60 can no longer seize the lever 51. On the contrary the electromagnet 66 serves for closing the switch again. When this electromagnet attracts its armature 65 the right-hand end of the lever 51 is first placed against the screw 57; the lever 51 then rotates around the point of this screw until it hits against the screw 58. When this has happened the left-hand end of the bar is so low that the catch 60 can engage the end of the lever. Now as soon as the action of the electromagnet 66 ceases, the

lever 51 flies upward in consequence of the action of the spring 59, and the left-hand end of the lever lies under the point of the catch 60, whereas the right-hand end lies against the contact screw 56. The main circuit is thereby closed again.

The circuit of the electromagnet 66 goes by way of the terminal 68, lever 51, contact screw 54 or contact screw 57 to a terminal 69 of the electromagnet 66, and consequently it can only be energized when the lever 51 contacts either the screw 54 or the screw 57. When the lever is in the cut-out position and at rest, it contacts the screw 54. When the armature 65 is attracted by the electromagnet 66 the connection between the contact screw 54 and the lever 51 is interrupted. In order to avoid the circuit in which the electromagnet 66 is connected being interrupted prematurely, the screw 57 is also used as a contact screw and connected with the screw 54. Now when the main circuit is closed again the lever 51 first lies against the screw 57 and is only then withdrawn from the screw 54 at the left-hand end. Consequently the circuit of the electromagnet 66 is kept closed as long as the lever 51 lies on the screws 57 and 58 in consequence of the electromagnet 66 attracting its armature.

Two of the above described apparatuses are connected with the known means, as represented in Figs. 1^a and 1^b. The switch levers 14 and 18 correspond in their mode of operation to the switch lever 51 shown in Figs. 2 to 4. The switch lever 14 belongs to those means which are for canceling the group of holes of a word, whereas the switch lever 18 serves for canceling lines. The connections of the circuits are as follows: The conductor 12 coming from the battery 1 branches at 26. The branch leads to the spring 19 of the device for canceling lines and to the lever 18 of the same device. The main circuit contact 17 of this device, which corresponds to the contact 54 in Figs. 2 to 4, is connected by the conductor 16 and spring 15 with the switch lever 14 of the device for canceling words. The main circuit contact of this device forms the end of the conductor 9, with which all the levers of the auxiliary switches 20_a, 20_b, to 20_i are connected. In this arrangement the conductor 9 can be disconnected from the source of current both by reversing the lever 14 and also the lever 18. For this two electromagnets 25_a and 25_b are used, namely the electromagnet 25_a for lever 18 and 25_b for lever 14. Both electromagnets belong to the above mentioned character electromagnets 25 and are so connected in circuit that they are actuated by the perforated symbols denoted by their indices. In the case of the electromagnet 25_a this action occurs when a hole *i* of the register band acts on the switch 4, and hole *k* on the switch 4. The follow-

ing circuit is then closed: negative pole of battery 1, switch 4₁, conductor 5₁, coil 7₁, conductor 10₁, branch conductor 27, electromagnet 25_{1k}, conductor 28 to the valve-cell 24₁, conductor 21₁ to the switch lever 20_{1k}, conductor 9, and by way of contact 13, lever 14, spring 15, conductor 16, contact 17, lever 18, spring 19, conductor 12, to the positive pole of the battery 1. The contact lever 20₁ is closed by the action of the coil 8_k, which obtains its current by way of switch 4_k, conductor 5_k, winding 8_k, conductor 11 and conductor 12. In like manner the electromagnet 25_{ab} is operated when the switches 4_a and 4_b are closed by the perforated symbols *a* and *b* of the perforated band. A current then flows along the conductor 5_a to the coil 8_a and to the conductor 9 which is connected with the conductor 12 and the positive pole of the battery 1. In this manner the switch lever 20_a is placed against the contacts 21_a and the following circuit is closed: from the negative pole of the battery 1 by way of switch 4_b, conductor 5_b, lever 20_a, contact 21_a, conductor 29 to the coil 25_{ab}, the other end of which is connected with the conductor 9, to the positive pole of the battery 1. When the electromagnet 25_{1k} is operated, the circuit is broken by the reversal of the switch lever 18. The circuit can then be closed again only by the electromagnet 30. This electromagnet is connected by the conductor 33 with the conductor 10₁. It is therefore dependent on the operation of the switch 4₁ and on a hole *i* of the perforated band. On the other hand the electromagnet 30 is connected by a conductor 34 with the contact 35 of the switch lever 20_m. The latter again is connected by a conductor 36 with the contacts 37 and 38. The latter contacts correspond to the contact screws 54 and 57 in Figs. 2 to 4. If the lever 18 is in the cut-out position, these contact screws are connected by the lever 18 and the spring 19 with the conductor 12. From the latter, and consequently from the positive pole of the battery 1, there is a connection to the electromagnet 30 as soon as the switch lever 20_m is closed. The latter is dependent on an electromagnet 6_m, the coil of which is connected in series with the electromagnet 6₁, and is consequently energized as soon as a hole *l* of the register band acts on the switch 4₁. The electromagnet 30 thus comes into operation when two holes *i* and *l* of the register band act on the switches 4₁ and 4₁, presupposing that the switch lever 18 was previously brought into the cut-out position and the contact 37 was thereby closed. In like manner the switch lever 14 is dependent on the electromagnets 25_{ab} and 31. The former breaks the circuit, the latter returns the switch lever 14 into the circuit closing position. The electromagnet 31 can

only operate when the switch lever 14 contacts with the contact 39 or the contact 40. Both are connected through the conductor 41 with the switch lever 20_n and, further, by the contact 42 and the conductor 43 with the electromagnet 31 when the switch 20_n is closed. The latter electromagnet is operated as soon as a perforated symbol *k l* acts on the two switch levers 4_k and 4_l after the circuit has previously been broken by the switch lever 14.

As already stated above, the switch lever 18 serves for canceling lines and the switch lever 14 for canceling words. In order to return the switch lever 18 into the circuit closing position, the perforated symbol *i l* is used which serves as symbol for the end of a line when the register band is operated normally. In like manner the perforated symbol *k l* serves for switching in the lever 14, which symbol serves otherwise for setting the member for the space between two words. As soon as one of the switch levers 14 and 18 has been brought into the cut-out or canceling position, in consequence of the conductor 9 being separated from the source of current, the perforated symbols *i l* and *k l* and with them the character electromagnets 25_{1i} and 25_{k1} can not act normally. On the other hand, of the electromagnets 30 and 31 only that one can operate of which the switch lever 18 or 14 was previously brought into the cut-out position and consequently contacts the contact 37 or 39. Particularly the symbol *k l* for the separation of two words, when it occurs within a canceled line, can not switch in the lever 18 prematurely, since it does not influence the electromagnet 30.

The switching device represented in Figs. 2 to 4 can also be used for canceling the action of individual perforated symbols in similar manner as it is used for canceling words and lines. This arrangement has certain advantages. For example, it is of value for the composer to be able to cause symbols for the ends of lines, symbols for the space between two words, justifying symbols, symbols for canceling words and lines, and the like, which have been perforated in error too soon, to become inoperative occasionally individually. This also can be effected at once with the device represented in Figs. 2 and 3 when it is connected in circuit in the manner represented in Fig. 5. In this case the switching device has to be connected in suitable manner with the conductor 2. The conductor 2 coming from the battery 1 leads through the spring 71 to the switch lever 72. From the rest contact 73 the conductor 74 goes to the conductor 3. Further, from the contacts 78 and 79 a conductor 75 leads by way of the switching-in electromagnet 77, the resistance 76 to the conductor 74. For doing away with the action of the perforated

band the electromagnet 80 is used which has to be connected in circuit in place of any one of the character electromagnets 25. When the electromagnet 80 is energized the lever 72 parts from the contact 73 and lies against the contact 78. The connection from the battery 1 to the conductor 3 is not completely interrupted, but a connection remains by way of the conductor 2, spring 71, lever 72, contact 78, electromagnet 77, resistance 76, conductor 75, conductor 74, to the conductor 3. The winding of the electromagnet 77 and the resistance 76 are so proportioned that, in consequence of the current being weakened, the character electromagnets 25 cannot act. But the electromagnet 77 is so sensitive, in consequence of its winding of fine wire, however, that it is sufficiently energized by the weakened current in order to be able to attract its armature 82. Now if any perforated symbol of the perforated band acts on the switches 4_a to 4_i after the bar 72 has been released from the catch 81 by the magnet 80, the electromagnet 77 is operated and pulls the lever 72 down. The latter first lies, as above described, against the contact 79, is caught by the catch 81, and lastly lies against the contact 73. The latter event only happens when the electromagnet 77 has ceased to act. In this manner each individual perforated symbol can be made inoperative by a preceding symbol which acts on the electromagnet 80.

The above described switching means can be used in various ways. The register band can be passed through the type-setting machine both in the direction in which the band is made and also in the opposite direction. In the above description it has been supposed that the register band runs through the type-setting machine in the opposite direction to that in which the band is produced, and that consequently those symbols, which are perforated after the sections which are to be canceled, become operative in the type-setting machine before these sections, as is at once understood. If it is wished to pass the register band through the type-setting machine in the direction in which the band is made, which is preferable under certain circumstances, it must be otherwise arranged that the operation of the band is stopped opportunely at the defective places. For this purpose the register bands may be subjected in known manner to a special process in which the symbols, which are perforated according to the groups of holes which are to be canceled, automatically bring about the perforation of new symbols which are in front of the groups of holes which are to be canceled. The only question here is which canceling and inserting symbols are to be used in the two cases, and how these are to act on the described switching means. A change of

the switching means in itself is only necessary to the extent that the electromagnet 25 *k l*, which according to the above should be used for setting the symbols for the separation of words, must be omitted, so that the symbols for the spaces between two words have to be set by any other character electromagnet 25. Consequently there is one character electromagnet less at disposal. As the symbol for the space between two words there must then be employed a symbol which consists of the hole *b* and one of the holes *c* to *k*. If a word has been perforated incorrectly and is to be canceled, the perforated symbol *k l* is punched behind the word. In the intermediate process to which the band is subjected this latter symbol has to cause a hole *a* to be added to the symbol for the space between two words which is in front of the defective word. If for example as symbol for the space between two words the symbol *b e* is used, the defective word is lastly between the symbols *a b e* and *k l*. At the symbol *a b e* the following occurs: In consequence of the action of the hole *a* the switch 4_a is first closed and the switch lever 20_a is reversed to the contact 21_a. The following circuit is made through the hole *b* of the symbol: From the battery 1, by way of conductor 3_b, switch lever 20_a, contact 21_a, conductor 29 to the electromagnet 25_{ab} and on to the conductor 9 and source of current 1. Consequently the electromagnet 25_{ab} is energized and cuts off the current by means of the lever 14. The sign *b e* cannot operate simultaneously, because the character electromagnet 25_{be} remains without current in consequence of the separation of the contact lever 20_a from the contact 22_a and the conductor 10_b. Behind the group of holes which is to be canceled there is the symbol *k l* which acts on the electromagnet 31 in the manner which has already been described.

The switching device represented in Figs. 2 to 4 has the special peculiarity that the cut-out and cut-in magnets only cut themselves out of circuit by their operation when the intended action is completely brought about. In the described switching means there is no automatic interruption which could have as a consequence an oscillation of the armature and finally the armature remaining in a wrong position. Further, the insertion in circuit takes place without the cooperation of the type-setting machine and without a pause in the movement of the band. For this reason the means are suitable particularly for high speed type-setting machines in which the band is not moved intermittently in the machine but continuously.

In Figs. 6, 7 and 8 parts of a register band are represented which show the perforated symbols which come into considera-

tion here. The eleven places for perforations are denoted by the letters *a* to *k*. Fig. 6 shows a portion of a band in which an entire, or commenced line is made inoperative. At 90 and 91 there are the symbols *i* *l* for the termination of a line which separate the group of holes shown from the previous and following lines. At 92 the symbol *i* *k* for canceling a line is perforated. The band runs in the apparatus in which it is made in the direction of the arrow 93 and in the type-setting machine in the direction of the arrow 94. If the band is to operate in the direction of the arrow 93 when setting type also, the symbol *i* *k* will be perforated at 95 previously by hand by the composer or by means of a special apparatus.

Fig. 7 shows a portion of a band in which a group of holes representing the German word "den" is made inoperative. The symbol *a* *b* at 96 is behind this group of holes considered in the direction of the arrow 98 which indicates the direction in which the band is made, and in front of this group of holes when considered in the direction of composing shown by the arrow 99. The operation of the band is cut in again by the symbol *k* *l* at 97 for the space between two words. The band moves in the type-setting machine in the direction of the arrow 99.

In Fig. 8 the cancellation of a word is represented for the case in which the band moves in the type-setting machine in the same direction, indicated by arrow 100, as when it is being made. The symbol *b* *e* serves as the symbol for the space between two words. One hole in the position *a* is added in front of the German word "den" at 101 to this symbol, by means of which the operation of the band is annulled. The symbol *k* *l* at 102 causes the band to be operative again.

Fig. 9 shows a portion of a register band, where a single perforated symbol is canceled. There is at 103 a symbol showing the letter "n" made by mistake. To do away with that mistake immediately after that symbol is made the symbol 104, which is the symbol to cancel single letters. Then comes the symbol 105, which is the right character for the letter "m." The register strip goes through the type setting machine in the direction of the arrow 106. In doing so after setting the letter "m" by the symbol 105, the canceling symbol 104 makes inoperative the respective electromagnets for the following symbol. Then the immediately thereafter following symbol 103 brings again into action those electromagnets, without perforating the register strip with the respective symbol.

In the following claims I denote as a canceling symbol any one representation on the

operating band which is determined to stop the action of the type setting machine for the purpose of eliminating undesired matter represented on the band; any one representation which is determined to start the operation of the type setting machine again after undesired matter represented on the band has passed the machine, I denote as a re-inserting symbol.

What I claim as my invention and desire to secure by Letters Patent is:

1. In means for automatically operating type setting machines the combination of a perforated band containing both character selecting symbols comprising incorrectly punched single characters, words and lines, and also character canceling symbols, word canceling symbols, line canceling symbols, word separating symbols and line separating symbols, means controlled by said line canceling symbols for rendering said character selecting symbols inoperative, means controlled by said line separating symbols for rendering operative said character selecting symbols after the same have been rendered inoperative by said line canceling symbol, means controlled by the word separating symbol for rendering operative said character selecting symbols after the same have been rendered inoperative by means of a word canceling symbol, means controlled by the said character canceling symbols and rendering said character selecting symbols inoperative and means controlled by each of the said character selecting symbols for rendering operative the same after they have been rendered inoperative by means of a character canceling symbol.

2. In means for automatically actuating operating electromagnets of a type-setting machine, wherein the circuit connections for said operating electromagnets are controlled by a perforated band, said operating electromagnets being connected with a common conductor, the combination, with the latter, and the source of current for operating said electromagnets, of two electromagnetic switching devices connected in series between said common conductor and said source of current, the electromagnets of said electromagnetic switching devices being connected, substantially as shown, with said circuit connections, for rendering inoperative perforated symbols in the band.

3. In means for automatically actuating operating electromagnets of a type-setting machine, wherein the circuit connections for said operating electromagnets are controlled by a perforated band, said operating electromagnets being connected with a common conductor, the combination, with the latter, and the source of current for operating said electromagnets, of an electromagnetic switching device comprising a plurality of contacts, a spring-pulled bar adapted to con-

tact with the latter, a catch for holding said bar in its "on" position, a releasing electromagnet for releasing said catch from said bar whereupon the bar is pulled into its "off" position, and an inserting electromagnet for returning said bar from its "off" to its "on" position; a conductor connecting said bar with the source of current, said common conductor being connected with a contact which is contacted by said bar when in its "on" position, the remaining contacts being connected with the armature of one of said operating electromagnets, and conductors, substantially as shown, connecting said releasing and inserting electromagnets with said operating electromagnets.

4. In an electromagnetic switch, a base, two contacts mounted thereon, a set-screw on said base between said contacts, two sup-

ports having slots in the same on said base 20 below said contacts, a bar movable freely in said slots, catch adapted to hold one end of the bar, and a spring arranged attached to said bar between said set-screw and one of said contacts and tending to pull the bar upward, the arrangement being such that when said catch holds one end of the bar the other end of the bar contacts with one of said contacts, whereas when the bar is released by said catch, the bar contacts only 25 with the other contact and said set-screw. 30

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

HEINRICH DREWELL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.