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F. H. EELES ET AL

PERFORATING MACHINE

Original Filed Feb. 16, 1925 2 Sheets-Sheet 1

Fig.1

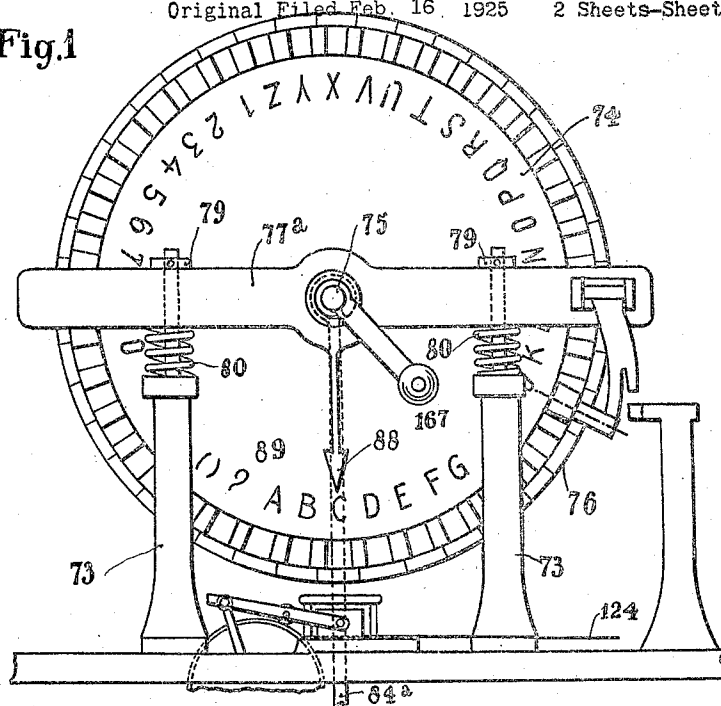
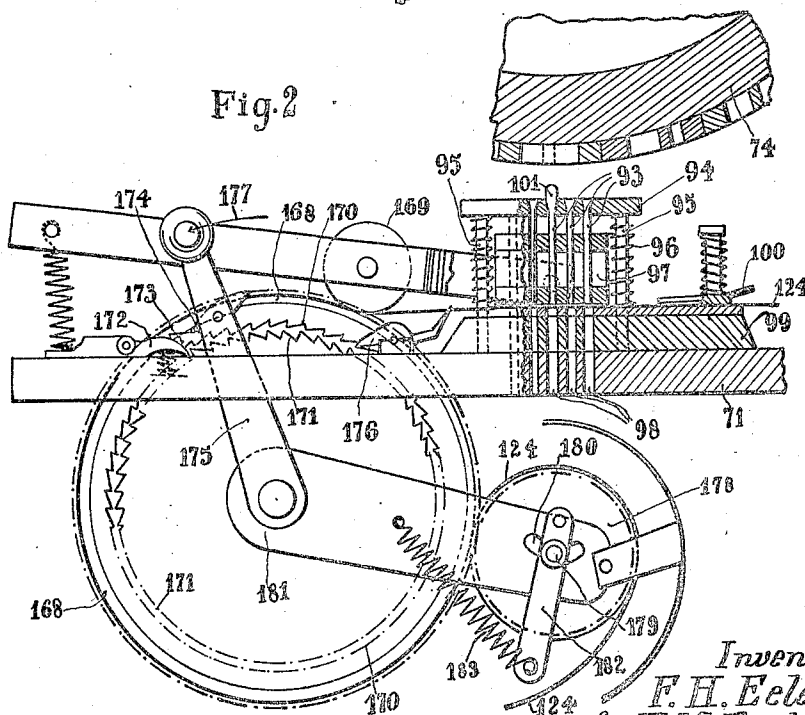


Fig.2



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Fig.3

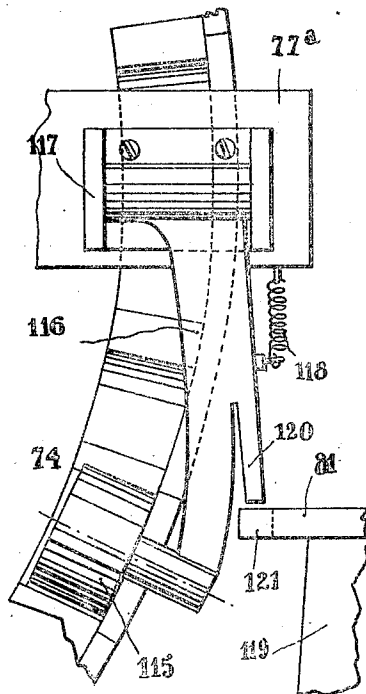
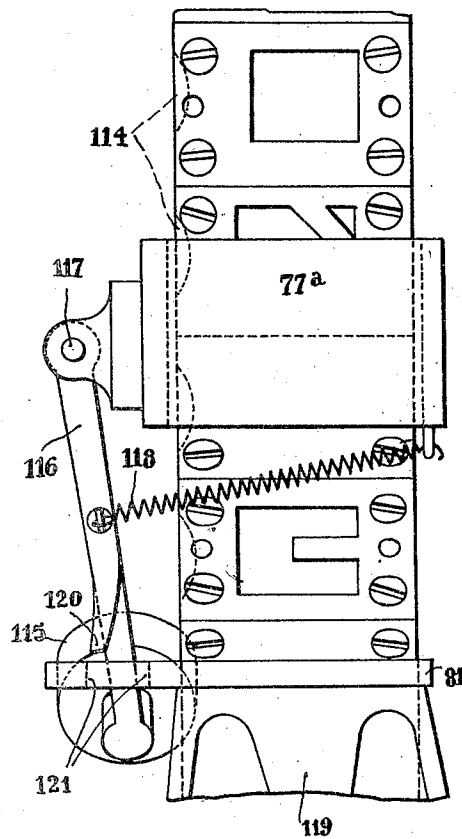


Fig.4



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UNITED STATES PATENT OFFICE.

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PERFORATING MACHINE.

Original application filed February 16, 1925, Serial No. 9,527, and in Great Britain February 18, 1924.
Divided and this application filed March 13, 1926. Serial No. 94,535.

The following is a division from our application Serial No. 9527 dated the 16th February, 1925.

This invention relates to a machine for perforating bands of paper or other materials, particularly bands in which the perforations are provided for the purpose of permitting the bristles of a card to come into contact with fixed studs, in a switching device for electric signs the perforating machine according to the invention comprises a rotary drum capable of being raised and lowered and having dies on its periphery, the solid parts of which correspond to the perforations to be effected in the band, each of these dies being capable of being set, through the rotation of the drum, in a position where they cooperate with a group of punches situated vertically under the axis of rotation of the drum, those of the punches which are situated opposite the solid parts of the die in question, being lowered by the downward motion of the whole of the drum, and perforating the band guided under these punches, whereas the punches which are opposite the hollows of the die are not lowered.

The invention also relates to means for preventing the lowering of the drum when any one of the dies on this latter is not in a position registering with the group of punches. These means can comprise an oscillating arm mounted upon the cross-member supporting the drum, and provided with a roller co-operating with lateral teeth of the drum, this arm having a projection which clears an abutment limiting the downward motion of the cross-member only when the roller is forced to the bottom of one of the teeth of the drum by means of a retracting spring acting on the said arm.

The invention comprises also a dial carried by the drum and a fixed pointer so as to indicate the correct position to which said die must be brought before lowering the drum; the arrangement being capable of inversion e. g. the dial being fixed, and the pointer attached to the drum.

The invention finally comprises a mechanism for advancing the perforated band in a perforating machine, having a drum over which passes the band after having left the punches and which carries two ratchet-wheels, the teeth of which are oppositely

directed to one another, the one being provided with a driving pawl, the other with a retaining pawl, so that the drum can be moved only in one direction, a special pawl being in engagement with the driving ratchet at the end of its movement in order to prevent it from continuing this movement by inertia.

A mode of carrying out the invention is represented by way of example in the accompanying drawings.

In these drawings:

Fig. 1 is a front elevation of a machine for perforating the bands according to the present invention.

Fig. 2 is a detail view on a larger scale, of the mechanism for driving the perforated band in this perforating machine.

Fig. 3 is a side view of the mechanism for positioning the drum.

Fig. 4 is an elevation of this mechanism.

This invention is supposed to be applied for perforating bands of paper, celluloid or other materials used in electric luminous signs and in which the perforations are utilized to permit contact between a metallic brush and contact studs to put lamp groups into circuit, each lamp group representing a letter or any character. These bands must be perforated for each letter or each character in a particular manner. Furthermore, in view of the special conditions under which this kind of apparatus is worked, it is necessary that the perforations can be established as required and in a quick manner. In Figs. 1 and 2 is shown a machine adapted to perforate bands of the type herein referred to with all the desired precision and rapidity.

A drum 74 carries on its periphery dies 76 and is mounted on a shaft 75 which latter is carried by a cross-member 77^a adapted to slide vertically, on uprights 73 on which it is mounted, springs 80 tending to thrust it normally upwards into its upper position limited by stops of any kind 79, so as to hold it away from the table of the machine on which the punches 93 are arranged. These latter are thirty five in number and are arranged so as to form a rectangle comprising seven punches, transversely to the band 124 and five longitudinally to this band. This combination of punches permits the formation of any desired letter, number or sign.

The punches 93 have a slightly widened head and are suspended in countersunk holes bored in a plate 94 which can slide along four columns 95 of which the head is slightly expanded. Around the columns 95 are arranged springs 96 tending constantly to thrust the plate 94 towards the top of its run. The punches 93 are guided in a hollow block 97 and can penetrate in the holes 98 bored in the base 99 of the group of punches and in the base 71. The band to be perforated 124 passes in the direction of the arrow under a spring press 100 then under the block 97, then through a feeding device, which will be described in greater detail hereafter. When the drum 74 is lowered, as, for example, by means of a pedal and through the medium of a rod 84^a Fig. 1, a die 76 being brought correctly in front of a group of punches, owing to the engagement of positioning pins 101 in the corresponding holes of each die, the plate 94 is lowered as well as those of the punches 93 which are opposite the full portions of the die 76. These punches therefore perforate the band 124 whereas the punches 93 which are situated opposite the hollows of the die 76 are not lowered and do not perforate the band. The discs punched out of the band 124 pass through the holes 98 and are collected in a suitable receptacle. When the drum 74 is raised, the plate 94 is raised by the springs 96 and draws all the punches upwards. It is then possible to cause the band 124 to advance through a certain distance, due to the feeding device which is now about to be described. To effect a perforation, it is necessary to impart to the drum, before lowering it on to the punches, a rotary movement, so as to bring the desired die to the lowermost part of the drum, opposite the punches. In order to facilitate this operation, as well as the correction of the setting in position of the die, the drum 74 carries, on its forward face, a dial 89 upon which are indicated the characters corresponding to the dies; an operating handle 167 enables the drum 74 to receive the desired movement and a fixed pointer 88 limits this movement and indicates the position where the chosen character should be. The arrangement could obviously be inverted, that is to say, the pointer 88 could be keyed to the shaft 75 of the drum and could move in front of a dial 89 fixed to the cross-member 77^a in such a way that to the letter which is situated in front of the pointer 88 corresponds at the lowermost point of the drum and in front of the group of punches 93 the die capable of effecting in the band 124 a perforation corresponding to the letter indicated by the pointer 88. The drum being correctly placed, it is then sufficient to lower it by operating the pedal and the band becomes perforated.

To avoid the cross-member 77^a being low-

ered when the drum 74 is not in the proper registering position desired between one of its dies 76 and the group of punches 87, provision has been made for the device shown in Figs. 3 and 4. The drum 74 has lateral notches 114, in which can enter a friction roller 115, carried by an arm 116 pivoting on an axis 117 arranged longitudinally with respect to the lever 77. The arm 116 is constantly forced back against the face of the drum 74 by a spring 118, so that the friction roller 115 is constantly urged to enter into the lateral notches 114 of the drum 74, and thus tends to give the drum 74 a predetermined position with respect to the cross-member 77^a, the upward stroke of which is limited by the stops 79. The arm 116 has a projection 120 which can pass, when the cross-member 77^a is lowered and when the friction roller 115 is seated at the bottom of a notch 114, in a notch 121 made in the shoulder 81 of an upright 119. If the drum 74 is not correctly positioned in respect of the cross-member 77^a and consequently in respect to the group of punches 87, the notches or teeth 114 of the drum 74 do not come opposite the friction roller 115, so that the latter is slightly displaced to the left in Fig. 3, this having the effect of diverting the arm 116 to the left. Under these circumstances, if one seeks to lower the cross-member 77^a, the projection 120 can no longer pass in the notch 121 and comes into contact with the upper face of the shoulder 81, this having the effect of preventing the lowering of the cross-member 77^a.

When the perforation has been effected it is necessary to advance the band by a suitable amount so that the next perforation may be made. This advance of the band is effected as follows: The band 124, after having left the punches, is caught by a drum 168 on which it is held by an elastically controlled roller 169, and to which are fixed two ratchet-wheels 170 and 171, the teeth of which are oppositely directed. A retaining pawl 172 normally held out of engagement with the ratchet 171 by means of a spring can only be engaged therewith by the action of a finger 173 formed on the end of a catch 174 carried by a movable arm 175 and which is in engagement with the ratchet 170. A retaining pawl 176 is constantly in engagement with this latter ratchet, so as to prevent any backward movement of the drum 168. It will be understood that when it is desired to advance the band 124, it will suffice to impart to the arm 175 a movement in the direction of the arrow 177, thereby advancing the drum 168, and, consequently, the band 124 by means of the pawl 174. When this arm 175 has reached the end of its forward stroke, the finger 173 of the pawl 174 will bear upon the pawl 172 which will be brought into engage-

ment with the ratchet 171 and will prevent the drum 168 from continuing its movement by inertia. When the movable arm 175 returns to the rear, the pawl 172 is abandoned by the finger 173, thus liberating the drum 168, but the pawl 176 prevents the return thereof. Obviously the amplitude of the movement of the movable arm 175 is determined in such a way that it corresponds to the width of a character and to the distance which separates two consecutive characters. The characters are generally of the same width, but the width can vary for some of them, for instance for the letter I. It is therefore sufficient to reduce the return movement of the movable arm 175 in order to obtain only an advance of less amplitude of the drum 168.

The advance of the perforated band 124 by the drum 168 is assured by means of a pressure roller 178 the shaft 179 of which is adapted to move in a groove 180 formed in a fixed arm 181. The shaft 179 of the roller 178 is carried by an arm 182 normally drawn back by a spring 183 attached to the arm 181, so as to hold the roller 178 tightly against the drum 168.

Various modifications of detail may also be made in the arrangements which have just been described without the spirit of the invention being in any way changed thereby. For example, the advance of the perforated band in the machine just described may be obtained automatically by connecting the operating crank handle 177 of the ratchet-wheels to the die carrying drum or to a member dependent on the drum.

We claim:

1. A perforating machine for the preparation of perforated bands for use in electrical luminous signs comprising in combination a rotary drum adapted to be raised or lowered, dies arranged around the periphery of said drum, the parts of said dies corresponding to the perforations to be effected in the band, a group of punches placed vertically below the axis of rotation of said drum, means for guiding said band below said group of punches, and means for raising and lowering said drum.

2. A perforating machine for the preparation of perforated bands for use in electrical luminous signs comprising in combination a rotary drum, the axis of which is mounted on a cross-member, two standards carrying said cross-member, so that the latter may be displaced vertically up or down,

dies arranged around the periphery of said drum, lateral grooves in said drum, a friction roller adapted to engage in said grooves, an oscillating arm pivoted to said cross-member and carrying said friction roller, a spring causing said friction roller to enter one of said lateral grooves, a stop limiting the descending movement of said cross-member, a group of punches placed vertically below the axis of rotation of said drum, means for guiding said band below said group of punches, all the aforementioned parts being arranged in such a way that said shoulder clears said stop only when the lowering of said drum is effected when the lowermost die on the latter is in a registering position in respect to said punches.

3. A perforating machine for the preparation of perforated bands for use in electrical luminous signs, comprising in combination a rotary drum, dies arranged around the periphery of said drum, a group of punches placed vertically below the axis of said drum, a dial integral with said drum, a fixed pointer showing the correct position that the die about to be used should occupy.

4. A perforating machine for the preparation of perforated bands for use in electrical luminous signs, comprising in combination a rotary drum, dies arranged around the periphery of said drum, a group of punches placed vertically below the axis of said drum, means for guiding said band below said group of punches, a pointer integral with said drum, and a fixed dial placed in front of said pointer so as to show the correct position to be occupied by said drum in order that a given die shall be situated at the lowermost point of said drum.

5. A perforating machine for the preparation of perforated bands for use in electrical luminous signs comprising a rotary drum, dies arranged around the periphery of said drum, a group of punches placed vertically below the axis of said drum, means for guiding said band below said group of punches, a band actuating drum carrying two ratchets of opposite directions, the one an actuating ratchet provided with an actuating pawl, the other a retaining ratchet provided with a retaining pawl so as to be rotatable only in one direction, a special pawl being in engagement with said actuating ratchet to prevent same to continue its movement by inertia.

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