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| [33] | | Germany |
| [31] | | H63211 |

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[50] Field of Search..... 95/4.5, 14,
87; 355/27, 28

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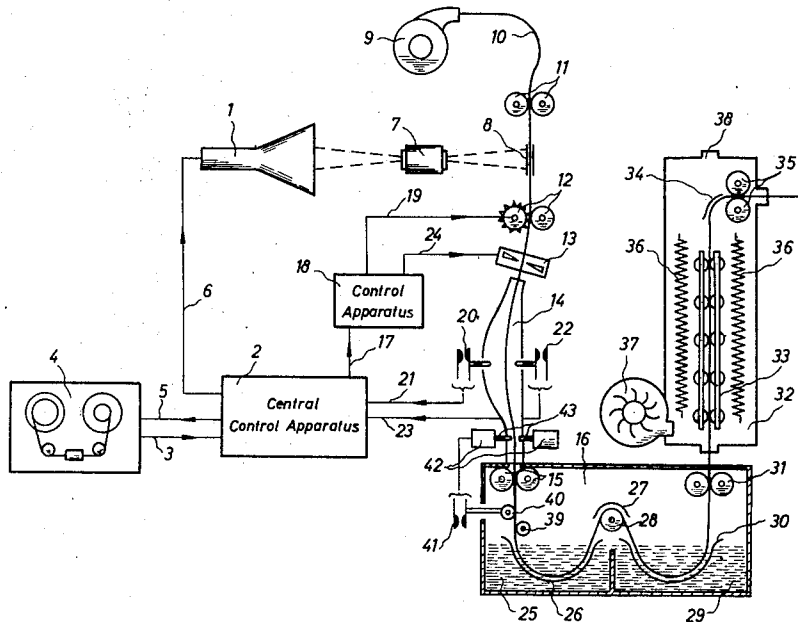
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- [54] APPARATUS FOR CONTROLLING THE PASSAGE
OF PHOTOMATERIAL THROUGH AN
ELECTRONIC PHOTOTYPE SETTER
9 Claims, 2 Drawing Figs.**

- [52] U.S. Cl. 95/14,
226/24; 95/96; 355/27, 355/28

ABSTRACT: An apparatus for controlling the passage of photomaterial through an electronic phototype setter which operates in conjunction with an automatically operated developing apparatus. Switching means are provided and actuated by the photomaterial to cause the setter to stop when the photomaterial accumulates between the outlet of the setter and the inlet of a developing apparatus. A cutting device is provided to cut the photomaterial when the material is stretched between the setter and the developing apparatus.



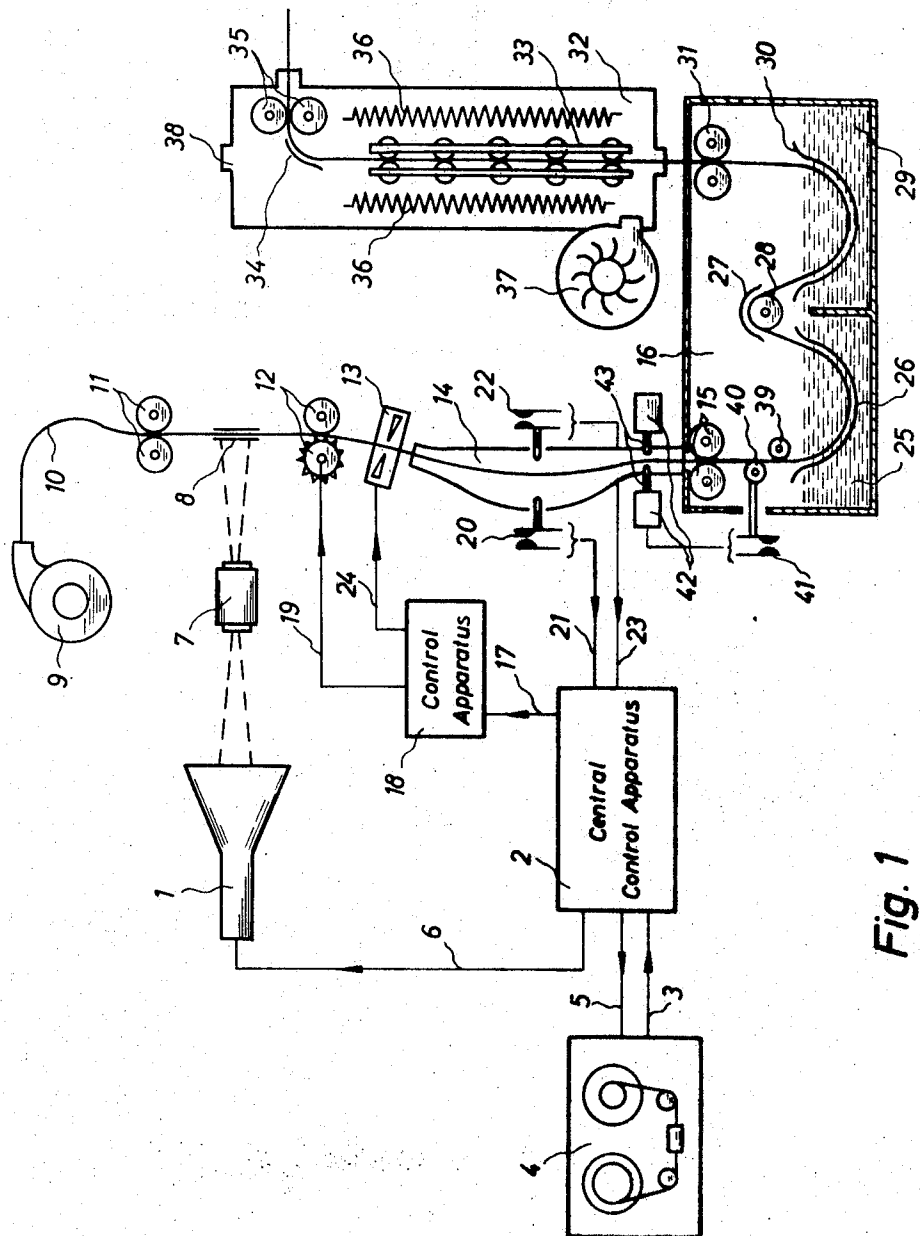


Fig. 1

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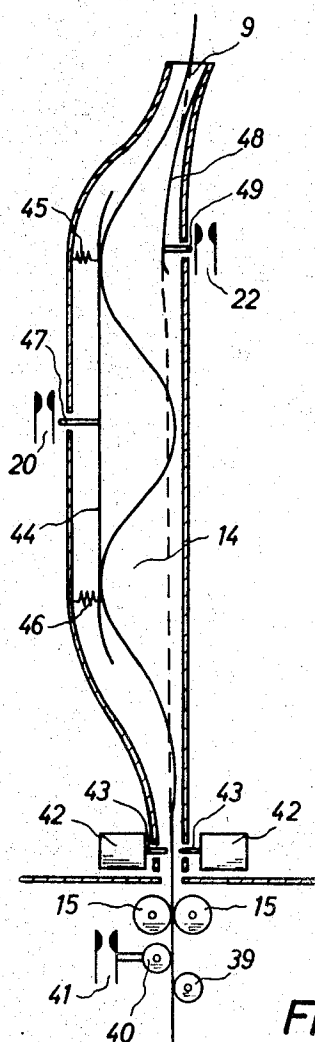
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3,557,675

SHEET 2 OF 2



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APPARATUS FOR CONTROLLING THE PASSAGE OF PHOTOMATERIAL THROUGH AN ELECTRONIC PHOTOTYPE SETTER

BACKGROUND OF THE INVENTION

Field Of The Invention

The present invention relates to apparatus for controlling the passage of photomaterial through an electronic phototype setter cooperating with an automatically operated developing apparatus.

Electronic phototype setters, controlled by computers, can set several hundreds of characters per second. A text set in a phototype setter is initially only latent in the form of an exposed film or photopaper and is not immediately utilizable. However, it is desired to have the exposed photomaterial developed and dried as quickly as possible after setting. This is desirable particularly when the set material is first to be used for proofreading. Slip proofs preferably consist of paper which is provided with a photosensitive layer suitable for rapid developing. The photopaper is fed through the phototype setter by an automatic developing apparatus. There it passes through two baths, an activator bath and a stabilizer bath, and through a drying chamber and then leaves the phototype setter for further use. The time between exposure and drying amounts to about one minute.

The setting operation with the phototype setter and the developing apparatus must be regarded as a continuous operation, at least for periods of time during which a whole roll of material is set. The length of the strip of a roll amounts to about 100 meters.

The speed of production of the photomaterial in the setting device which has been exposed and is being developed, is varied. In particular, the length of the lines and the size of the script used has a bearing on this speed. The narrower the column and the greater the size of script, the quicker the exposed strip is produced. Production continues correspondingly more slowly in the case of long lines and small script. Further factors introduce further irregularities. For example, small setting intervals may arise which are dependent upon the computer program. The setter can even come to a complete standstill from time to time, for example, when new photomaterial has to be inserted, or a punched or magnetic control tape has to be changed. On the other hand, blank advance movements have an accelerating effect in the setting proofs. The speed of production of exposed material is, therefore, irregular within wide limits.

The developing apparatus on the other hand requires a constant speed of operation. The darkening of the character images depends upon the time that the material dwells in the activator fluid. Deviations from a certain speed of passage upon which a specified blackening necessary for the printing process depends, are not allowed. However, the developing apparatus should above all not be stopped while photomaterial is still located therein since the material would become unusable.

SUMMARY OF THE INVENTION

The object of the invention is to make possible the cooperation of both apparatus despite these very different operational requirements. This is ensured according to this invention by providing switching means which cause the setter to stop when the photomaterial accumulates between the outlet of the setter and the inlet of the developing apparatus, and to cut through the photomaterial when it is stretched, and prevents the photomaterial from entering the developing apparatus if a previously cut piece of material has not passed completely thereto.

Advantageously, a cutting device is arranged between the outlet of the phototype setter and the inlet of the developing apparatus, and an elongated guideway is provided for the photomaterial, furthermore a contacting device, responding when the photomaterial accumulates in said guideway, actu-

ates to stop the production of clock pulses in the phototype setter and the acceptance of further setting information, and a further contacting device responsive to the pull of the photomaterial in the guideway, actuates to initiate an accelerated feed of the photomaterial by a certain length, and furthermore the cutting device is arranged to cause the photomaterial to be cut after this feed has terminated.

In order that the invention may be more clearly understood, one embodiment thereof will now be described by way of example with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the basic construction of the apparatus; and FIG. 2 shows in detail the guideway for the photomaterial.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, the left-hand side of FIG. 1 represents a phototype setter, which consists of a cathode ray tube 1 and a central control apparatus 2. The setter receives its order for operation and data from an input device 4 via a conductor 3. The input device 4 may be a tape recorder, a punched tape-reading device or even a computer. The data supplied to the setter via the conductor 3 are partly orders which relate to the operation, e.g. setting, width, size of script, beginning of a line, inter alia, and on the other hand, they are numbers or addresses of characters which are called up for setting. A conductor 5 serves to regulate the data flow between the input device 4 and the central control apparatus 2 of the setter. Then, data can only reach the control apparatus 2 if the conductor 5 indicates that the setter is ready for response.

The images of the characters are stored in coded form in an electronic store unit of the setter. When the characters are called up, the image information is interrogated in the store unit and serves to control the cathode ray tube 1 via a conductor 6 so that the characters appear on the screen as luminous images. The luminous characters are formed on the image plane of a film gate 8 by means of an optical system 7.

A strip of photomaterial 10 is guided from a film cassette 9, between guide rollers 11 and is exposed in the film gate 8. From there, the photomaterial is fed between conveyor rollers 12 and between the blades of a cutting device 13 into the opening in a guideway 14. After passing through this guideway 14, the photomaterial emerges at the lower end and passes between two rubber rollers 15. After the photomaterial has been gripped by these rollers, it passes at constant speed into a developing apparatus 16. The further feed of the photomaterial through the developing apparatus and a following drying apparatus is automatically effected by means of guide rollers, more drive rollers and deflector plates. This is described later.

When the setter has been set into operation, the photographic recording of the characters on the photomaterial located in the film gate 8 begins. After a ready-set line or a group of lines, the input device 4 issues an order to feed the photomaterial with the information regarding the number of path quanta, around which the photomaterial is to be conveyed. The photomaterial is, therefore, conveyed piece-by-piece, but each piece continuously. The orders for material feed reach a control apparatus 18 via the central control apparatus 2 and a conductor 17, the feed order being evaluated in the control apparatus 18 and conveyed via a conductor 19 to the drive rollers 12 which push the photomaterial further.

As the setting continues, more photomaterial is pushed between the blades of the cutting device 13 into the guideway 14. The intervals between the individual film feeds depend upon the length of the line and the size of the script, the lengths of the film feeds depend upon the size of the script and the line space. The feed of the film is, therefore, very irregular. If so much photomaterial is fed into the guideway 14 that its front end has reached the inlet slot of the developing apparatus 16, it is gripped by the rollers 15. From this moment, a uniform passage of the photomaterial through the developing

apparatus 16 must be maintained. This must also occur when, as has already been described, the photostrip is delivered from the setter more slowly or more quickly than the speed of passage through the developing apparatus.

The guideway 14 serves as a buffer between the setter and the developing apparatus. It is, therefore, comparatively long and is appropriately shaped. As seen on the drawings, the right-hand side is straight while the left-hand side is curved.

Let it be firstly assumed that the developing apparatus 16 operates more slowly than the rate at which the photomaterial is delivered. The result of this is that the strip in the guideway 14 is longer than the distance between the conveyor rollers 12 and 15. The strip bends towards the left because the entrance into the guideway 14 is inclined somewhat towards the left. It adapts itself more and more to the left-hand wall and finally accumulates. The photomaterial is so stiff that it thereby exerts a pressure in the direction of the left-hand sidewall where a contact 20 is actuated by the accumulated photomaterial. This contact signal is conveyed via a conductor 21 to the central control apparatus 2 and the production of clock pulses is interrupted. Via the conductor 5, the acceptance of further information from the input device 4 is prevented. The setting operation pauses for as long as the contact 20 is closed. No more characters are set and the feed of further photomaterial is stopped. However, the developing apparatus 16 continues to operate and meanwhile draws photomaterial from the guideway 14 whereby the accumulation is removed. After a short delay, the contact 20 opens again and releases the setter, and the setting operation continues. This case of operation offers no difficulties because the setter can be stopped at any time.

However, in the other case, when the speed of production of exposed photomaterial is lower than the speed of development of the material, the photostrip in the guideway 14 becomes shorter. It is thereby stretched and adapts itself closely to the right-hand sidewall of the guideway. However, before this happens, a contact 22 is actuated which transmits a signal to the central control apparatus 2 via a conductor 23. The contact 22 is actuated before the photomaterial is stretched too much and therefore the phototype setter has enough time to finish the line which it had begun to set. The order subsequently coming from the input device 4 which has for its results the return of the electron beam and the further feed of the photomaterial, is used in this case for interrupting the production of clock pulses in the central control device 2 and consequently stopping the setting operation. Therefore, the orders given continuously during the setting operation via the conductor 5 to the input device 4 are the first to stop. However, a signal passes at the same time via the conductor 17 to the control apparatus 18. The first result thereof is a release of the drive of the conveyor rollers 12 via the conductor 19, which rollers move on the photomaterial by a certain distance. The length of this distance is equal to a certain number of length quanta and is of such size that the part of the photomaterial which has just been exposed is conveyed a few centimeters beyond the cutting position. Hereupon, the cutting device 13 is actuated via a conductor 24 and the strip is cut through. The cut off strip can now pass unhindered through the guideway 14 into the developing apparatus 16. After being cut through, the tension of the photo strip and consequently the pressure against the contact 22 ceases. Said contact opens and the setting process continues.

The operation which has just been described occurs only in particular cases, namely when an unforeseen and unintended obstruction occurs in the setting operation. This may, for example, be the case if a new magnetic tape or a new punched control tape has to be inserted in the input device or if a punched control tape is torn and must be repaired. In this case, the photostrip must be cut through in order that the perforation does not tear or otherwise damage the photomaterial. A cutting control is not given by the computer and, therefore, the cut is effected at a position determined by chance. However, the measures described prevent a line from being lost.

The strip of photomaterial is cut only when the last exposed part has been conveyed further by a rapid advance movement up to a position after the cutting position and consequently cannot be lost. Due to this blank advance movement, a large line space occurs which is not provided for in the program. The line space, however, can easily be cut out later when the script is mounted.

The cutting controls are normally given by the program so that the cuts are made at the appropriate part in the text. The character sizes, the line steps and the length of the lines to be used for a setting order are known to the programmer. Therefore, he knows exactly how much photomaterial is conveyed per unit of time during undisturbed setting operation. If this length is smaller than the material length which the developing apparatus can process and which is also known to the programmer, the photostrip must be cut through. However, the programmer knows that the cuts must not be placed between the lines of a continuous paragraph, but between paragraphs or, better still, between columns. Besides, larger spaces exist here in order to be able to cut the photostrips for mounting purposes. In addition, shorter pieces of photostrips are more convenient for correction purposes than long strips.

The length of the guideway 14 (about 70 cm.), is large enough for the inclusion of two newspaper columns, each of about 30 cm. in length. For the present case, viz where the setter operates more slowly than the developing apparatus, it would be advantageous if, after setting one or two columns, a cutting control is given by the computer. The cutting position is so placed in the cutting position is so placed in the photostrip by blank advance movements that each column has sufficient space above and below.

The cutoff strips fall, by virtue of their weight, through the guideway 14 until they are gripped by the rollers 15. This prevents a cutoff the from being gripped before the preceding piece has completely passed into the developing apparatus. This locking device is described later. Let it firstly be assumed that the developing apparatus 16 is free. The piece of photomaterial is thus pushed through the rollers 15 into the chamber 25 and is there immersed in the developing fluid. By means of deflector plates 26 and 27, the photostrip is conveyed out of the developing fluid and around a freewheeling roller 28 into a stabilizing chamber 29 which is filled with fixing fluid. A further deflector plate 30 guides the fixed photostrip from the stabilizer chamber, upwardly between rollers 31. Like rollers 15, these rollers 31 are driven rubber rollers and have the same speed of rotation as the former, so that a piece of photostrip fed therein, which is gripped by the rollers 31, is conveyed further even when it has left the rollers 15. The smallest length of photomaterial admissible for developing is thus determined by the distance between the rollers 15 and 31, and amounts to about 30 cm.

The photostrip is now pushed by the rollers 31 into a drying chamber 32. It slides through a roller grid 33 and is deflected further by a deflector plate 34 between rollers 35. These are also driven rollers and give the photostrip the same speed of feed as rollers 15 and 31. The rollers 35 feed the already developed and dried photo strip from the apparatus into a pickup device (not shown) from which the set material is taken. In the drying chamber 32, heating resistors 36 are arranged on both sides of the roller grid 33, which dry the photostrip by radiant heat. A fan 37 supplies an air flow which removes the steam, issuing from the photomaterial, through opening 38.

Two photostrips to be developed must not pass through the developing apparatus 16 and the drying apparatus 32 at the same time, not even partly. This is because the following could occur; a photostrip of about 60 cm. length has been set and cut and passes into the developing apparatus 16. Then a shorter piece of photomaterial follows and this is cut through even before the previous piece has completely passed into the developing apparatus 16. It, therefore, falls down through the guideway 14 and could partly cover the preceding piece and pass into the developing apparatus 16 with it. Due to this

covering, a piece of photostrip would then be imperfectly, if at all, developed, and there would be the danger that the photostrips would stick to one another. This is prevented in the following manner; rollers 39 and 40 are arranged immediately below the rollers 15 in the developing apparatus 16. Roller 39 is mounted in fixed manner and serves as an abutment. On the other hand, the roller 40 is connected as a contactor roller to a resilient contact 41 via a web. If, as shown in the drawing, a piece of photomaterial is located between the rollers 15 and the roller 39, the contactor roller 40 is pressed towards the left. The contact 41 is closed and two magnets 42 to the right and left of the guideway 14 are energized. Thereby two pins 43 are pushed through holes in the wall of the deflector plates. These pins are located immediately above the rollers 15 and they are resilient and lie with such a light pressure against the incoming photostrip that they do not damage the strip. A second piece of photostrip, which was cut too early, falls through the guideway 14 stops either on the right-hand or left-hand pin. Only when the preceding strip has completely passed into the developing apparatus 16 and passed by the roller 40, does the roller 40 move towards the right under the pressure of the contact 41. The contact opens and the magnet coils 42 are deenergized. The pins 43 move towards the right and left from the guideway 14 and release the latter. The waiting piece of photomaterial can now fall through the outlet of the guideway 14 and is gripped by the rollers 15 and fed into the developing apparatus 16.

The guideway 14 which is shown only schematically in FIG. 1, is shown to a larger scale and explained more clearly in FIG. 2. For the following case, the guideway 14 must, in addition to checking whether photomaterial has accumulated or is stretched, also fulfill a storage or buffer function. Should, for certain reasons, the photomaterial not be cut, although the speed of setting is slower than the speed of passage through the developing apparatus, a blank advance movement must be given to the photomaterial by computer orders after each setting of a column and this blank advance compensates for the difference in speed. The blank advance speed is, at about 12 meters per minute, which is greater than the speed of development, which amounts to about 4 meters per minute. The advance length can be comparatively large and can amount to the length of the whole guideway. The delivered photomaterial must be stored in the guideway 14. A simple bending of the strip of photomaterial, as shown in FIG. 1, is no longer sufficient for this purpose. The guideway is therefore constructed as illustrated in FIG. 2. The strip passing into the guideway accumulates in several waves inside the guideway 14 between the fixed right-hand wall and a movable plate 44 on the left-hand side. This plate is pushed away by the springs 45 and 46 from the left-hand sidewall of the guideway 14 with a small force. It carries a pin 47 which projects through a bore in the left-hand sidewall and actuates the contact 20. This occurs after two to three waves have formed inside guideway 14 due to the accumulation of the strip 9. To this end, the length of the stored strip must be twice as long as the length of the guideway 14. This length corresponds to the storage capacity of the guideway 14.

Also the safety contact 22 which was shown only schematically in FIG. 1 has been illustrated more clearly in FIG. 2. The strip 9 of photomaterial is, as shown in FIG. 2, inserted into the guideway somewhat obliquely towards the left against the deflector plate 44. It slides over a contactor spring 48 secured to the right-hand upper inlet edge, without touching it or exerting pressure thereon, not even if the photostrip has formed waves. However, if a jamming occurs during the normal setting operation which is so great that the stored photostrip has entered the developing apparatus 16 before the setting operation begins again, the photostrip becomes tensioned due to the tension of the rollers 15. This is conveyed to a spring 48 which is curved towards the right and actuates the contact 22 with the aid of a pin 49. The further effect of this contact will be apparent from the description hereinabove.

It will be understood that variations and modifications may be effected without departing from the spirit and scope of the novel concepts of this invention.

I claim:

1. Apparatus for controlling the passage of photomaterial through an electronic phototype setter cooperating with an automatically operating developing apparatus, comprising first switch means actuated by the photomaterial to cause the setter to stop when the photomaterial accumulates between an outlet of the setter and an inlet of the developing apparatus, a cutting device, a second switch means actuated by the photomaterial for operating said cutting device to cut through the photomaterial when it is stretched.
2. Apparatus for controlling the passage of photomaterial through an electronic phototype setter cooperating with an automatically operating developing apparatus, comprising: first switch means actuated by the photomaterial to cause the setter to stop when the photomaterial accumulates between an outlet of the setter and an inlet of the developing apparatus, a cutting device, second switch means actuated by the photomaterial for operating said cutting device to cut through the photomaterial when it is stretched, and a blocking device, third switch means actuated by the photomaterial for operating said blocking device to prevent the photomaterial from entering the developing apparatus in the case that a previously cut piece of material has not passed completely thereinto.
3. Apparatus as claimed in claim 1, and further characterized by said cutting device being arranged between the outlet of the phototype setter and the inlet of the developing apparatus, an elongated guideway for receiving the photomaterial, said first switch means including a contacting device responding when the photomaterial accumulates in said guideway and actuating to stop the production of clock pulses in the phototype setter and the acceptance of further setting information, said second switch means including a contacting device responsive to the pull of the photomaterial in said guideway and initiating an accelerated feed of the photomaterial by a certain length, and said cutting device being arranged cut the photomaterial after the accelerated feed has terminated.
4. Apparatus as claimed in claim 3, wherein said first switch means includes a plate resiliently arranged on one side of said guideway pressed sideways by the strip of photomaterial which accumulates in waves in said guideway, said first switch means contact being actuated by said plate when the accumulation pressure has attained a certain value.
5. Apparatus as claimed in claim 3, wherein said second switch means includes a resilient spring arranged on one side near an inlet opening of the guideway, said spring being curved sideways by the tightening of a strip of photomaterial, said second switch means contact being actuated by said spring when the tension of the strip has attained a certain value.
6. Apparatus as claimed in claim 1, and further characterized by: a contactor arranged at the inlet of the developing apparatus to establish the existence of photomaterial at a contacting position, a plurality of electromagnetically controlled, resilient locking pins arranged closely in front of the contactor at the end of a guideway leading into the developing apparatus, and a contact actuated by the contactor when photomaterial is present at the contacting position, for moving said resilient locking pins into light contact with the material to prevent entrance of other strips of the photomaterial into the developing apparatus until the first-mentioned photomaterial moves past the contacting position.
7. Apparatus as claimed in claim 3, and further characterized by: a contactor arranged at the inlet of the developing apparatus to establish the existence of photomaterial at a contacting position, a plurality of electromagnetically controlled, resilient locking pins arranged closely in front of the contactor at the end of a guideway leading into the developing apparatus and a contact actuated by the contactor when photomaterial is present at the contacting position, for moving said

resilient locking pins into light contact with the material to prevent entrance of other strips of the photomaterial into the developing apparatus until the first mentioned photomaterial moves past the contacting position.

8. An apparatus for controlling the passage of photomaterial through an electronic phototype setter comprising: means for delivering the photomaterial through the phototype setter; means for delivering the photomaterial from the setter to a developing apparatus; means positioned between said setter and said developing apparatus for accumulating the photomaterial; first switch means responsive to the accumulation of the photomaterial between said setter and said developing apparatus to stop further advancement of the photomaterial to

said developing apparatus; second switch means responsive to the stretching of the photomaterial between said setter and said developing apparatus; and cutting means actuated by said second switch means to cut the photomaterial when the photomaterial is stretched between said setter and said developing apparatus.

9. An apparatus for controlling the passage of photomaterial through an electronic phototype setter according to claim 8 further including, means actuated by said second switch means to rapidly advance the photomaterial a predetermined length from said setter toward said developing apparatus before the photomaterial is cut.

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