Dec. 10, 1968 W. J. CALDER ET AL 3,415,176

PHOTOGRAPHIC PROCESSING APPARATUS

Filed Dec. 5, 1966 3 Sheets-Sheet 1

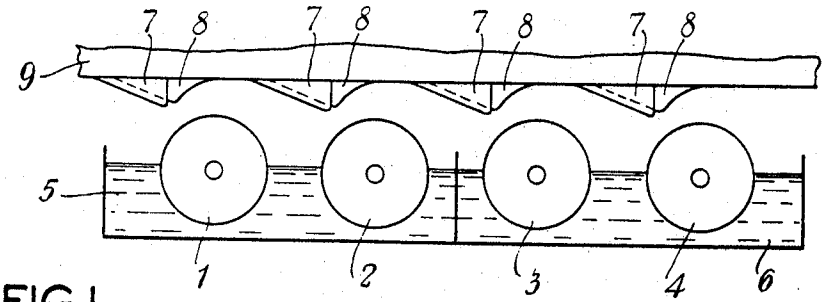

FIG. 1

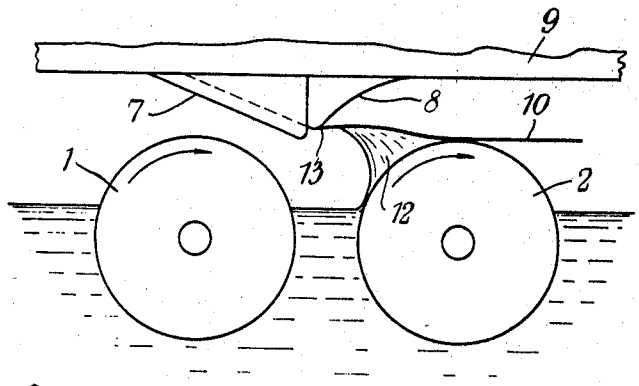

FIG. 2

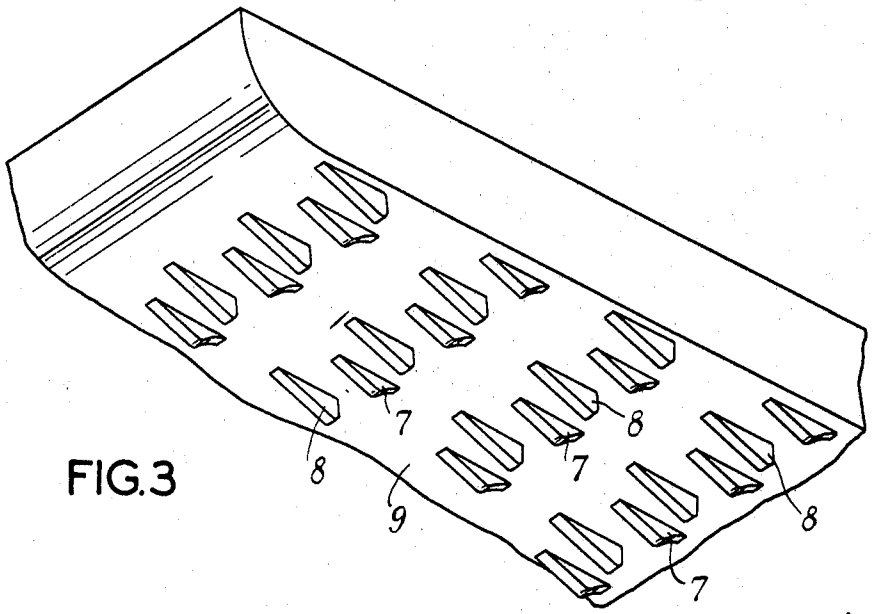

FIG. 3

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PHOTOGRAPHIC PROCESSING APPARATUS

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FIG.4

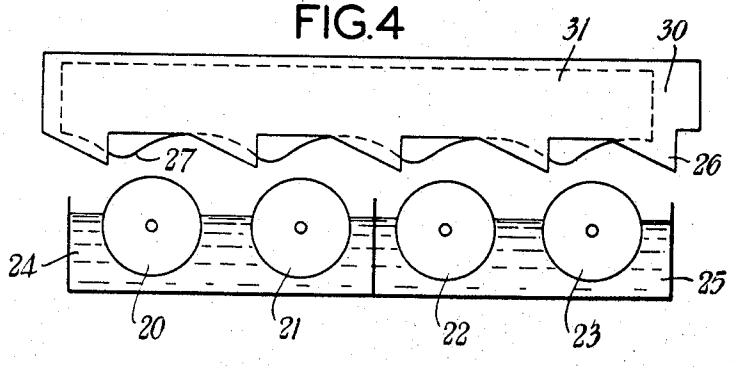


FIG.5

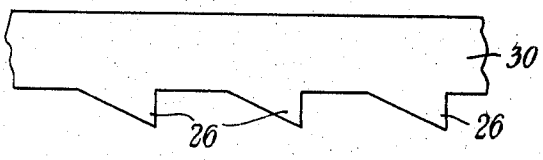


FIG.6

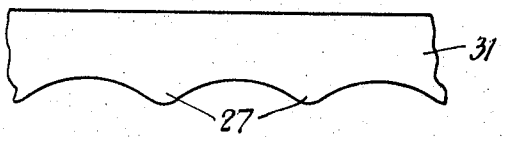
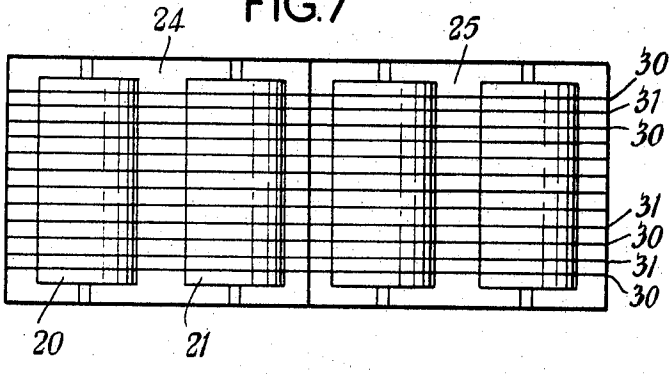


FIG.7



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PHOTOGRAPHIC PROCESSING APPARATUS

Filed Dec. 5, 1966 3 Sheets-Sheet 3

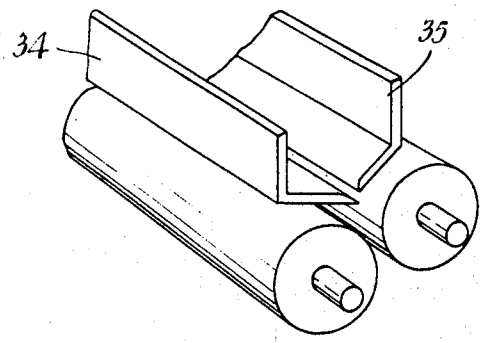

FIG.8

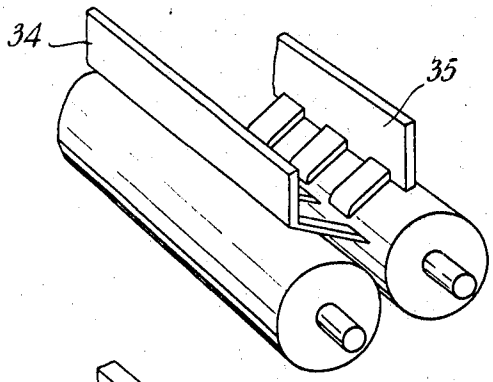

FIG.9

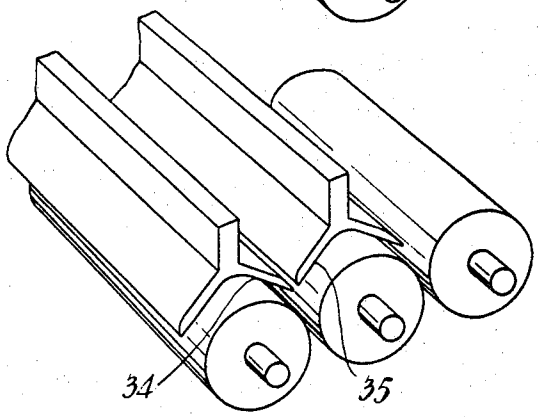

FIG.10

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United States Patent Office 3,415,176 Patented Dec. 10, 1968

3,415,176

PHOTOGRAPHIC PROCESSING APPARATUS

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Filed Dec. 5, 1966, Ser. No. 599,219
Claims priority, application Great Britain, Dec. 9, 1965, 52,390/65
5 Claims. (Cl. 95—94)

ABSTRACT OF THE DISCLOSURE

A photographic processing apparatus in which the processing solutions are applied to exposed material by applicator rollers. The material is guided on to the applicator rollers by a material guiding system having two sets of guide teeth provided in advance of each roller. The guide teeth serve to guide the leading and trailing edges of the material on to the applicator rollers.

This invention relates to photographic processing apparatus and in particular to apparatus for processing exposed galatino-silver-halide photographic sheet material for use in offices or the like.

When exposed silver halide photographic material is processed it is usually immersed in a developing solution to develop the latent image and then in a fixing bath to remove the unexposed silver halide. If the developing agent is included in the emulsion the material can then be processed by merely wetting the emulsion with an activator solution, which is usually an alkaline solution of high pH, and then passing the material into a stabilizer solution which does not remove the unexposed silver halide but converts it to a relatively light-insensitive complex. The latter type of material can be processed rapidly and conveniently and for this reason the material has been found to be of great value in the field of document copying for office use and also for the rapid production of positive prints from negatives.

In order to make use of the easy processing properties of developer-containing silver halide materials various forms of processing apparatus have been designed. In some of these the exposed photographic material is developed by passing it, emulsion face downwards, between a pair of rollers the bottom one of which is partially immersed in activator solution. The developed photographic material is then totally immersed in stabiliser solution and dried by passing it through a squeegee roller. However, other forms of processing apparatus have been devised in which only one side of the exposed photographic agent is made wet with activator solution. In these forms of apparatus the sheet of exposed photographic material is guided over the top of the activator solution applicator rollers, no processing solution being applied to the back of the sheets. In some forms of apparatus of this type both the activator and the stabiliser solution are applied to the photographic sheet by means of partially immersed rollers, the photographic sheet being held in position over the rollers by means of guide rails or by an array of discs.

In such forms of processing apparatus the photographic sheet material is conveyed through the apparatus by what is called "tendency drive," that is to say, the rotating applicator rollers, as well as applying processing solution to the emulsion surface of the photographic sheet material also tend to drive the photographic material through the apparatus. The driving force or traction applied by the applicator rollers to the photographic material varies considerably with each apparatus and also depends to a great extent on the physical characteristics of the photographic material being processed.

It has been found that good traction is provided on apparatus of this type which have an array of guide rails having teeth-like projections on them which partially project into the gap between the rollers. However, it has been found that when such guide rails are used the trailing edge of a sheet of photographic material, being processed, tends to pick up some of the processing solution from the bead which is formed between the sheet of photographic material and the applicator rollers, and to "flick" some of this solution on to the projecting teeth or into the root of the projecting teeth. When the next sheet of photographic material is passed through the apparatus, its leading edge touches these teeth and the processing solution comes off on to the back of the sheet of photographic material and forms a streak. If the processing solution is activator solution this streak will discolour the sheet of photographic material and possibly even cause buckling of the material along the streak mark, which will disturb the front surface of the material. This is due to the fact that the high pH of the activator solution thus applied to the back of the photographic material will not be neutralised by application of stabilizer solution.

It is the object of the present invention to provide a photographic processing apparatus of the type hereinbefore described in which the tendency to produce streaks on the back of photographic material is reduced.

Therefore there is provided in a photographic sheet material processing apparatus of the type which comprises, arranged after a material entry port, at least one set of two or more applicator rollers adapted to be rotatably driven and mounted with their axes disposed horizontally and parallel to each other with the lower surface of each roller dipping into a bath of processing solution there being a material guiding system associated with each roller which is adapted to guide the material on to the roller, at least one material guiding system which comprises two downwardly projecting guiding means both of which are located above the centre line of the applicator roller on the material entry port side of the applicator, one guiding means being located nearer the material entry port and projecting further downwards than the other guiding means by an amount sufficient to ensure that it serves to guide the leading edge and body of the material on to the roller and the other guiding means contacts only the trailing edge of the material and serves to guide this edge on to the roller.

By body of the material is meant the material between the leading and trailing edges.

It is preferred that there are two sets of two or more applicator rollers. It is preferred that each applicator roller in the apparatus has associated with it a material guiding system of the type hereinbefore described.

According to a particular embodiment of the present invention there is provided a photographic processing apparatus for processing exposed sheets of photographic material which comprises, arranged after an entry port, at least one set of two or more rollers adapted to be rotatably driven and mounted with their axes disposed horizontally and parallel to each other with the lower surface of each roller dipping into a bath of processing solution, the exposed photographic material being kept in position on the upper part of each roller by a material guiding system which comprises two sets of downward projecting teeth located above and on the entry port side of the roller, the teeth on one such set being located nearer the material entry port and projecting further downwards than the other by an amount sufficient to ensure that they serve to guide the leading edge and body of the material on to the roller and the teeth of the other set contact only the trailing edge of the material and serve to guide this edge on to the roller.

In alternative embodiments of this aspect of the invention the teeth are carried on blocks or on rails.

In another embodiment of the invention the material guiding system associated with at least one applicator roller comprises two downwardly projecting transverse rails.

The term photographic material includes photographic sheet material in web form on reels.

In order to illustrate the invention reference is made to the accompanying drawings in which:

FIGURE 1 illustrates a cross-sectional front elevation of a processing apparatus showing the position of the teeth between the rollers.

FIGURE 2 shows an enlarged view of the teeth.

FIGURE 3 shows a perspective view of a support which fits over the applicator rollers showing the two sets of teeth which project from the support.

FIGURE 4 shows another embodiment of the invention in which the teeth are carried on rails which extend across the applicator rollers.

FIGURES 5 and 6 show an enlarged view of the teeth as they are carried on the rails.

FIGURE 7 shows a plan view of the apparatus of FIGURE 4.

FIGURES 8–10 show alternative embodiments of the material guiding system in perspective.

In FIGURE 1 the processing apparatus comprises two sets of two rollers **1**, **2** and **3**, **4** in two baths **5** and **6** each of which contain processing solution. The solution in bath **5** is activator solution and the solution in bath **6** is stabiliser solution. Above all of the rollers, and associated with the roller to the right of them, there are arrayed two sets of downwardly projecting teeth—the first set **7** projects down further than the second set **8** by an amount sufficient to ensure that it serves to guide the leading edge and body of the material on to the roller and the second set **8** contact only the trailing edge of the material and serve to guide this edge on to the roller. Both sets of teeth are attached to a support **9**.

In FIGURE 2 there is shown an enlarged view of the rollers **1** and **2**. Above them, attached to the support **9** there is one of the set of teeth **7**, and one of the set of teeth **8**. Also shown in this figure is a sheet of photographic material **10** being processed. Between the sheet of photographic material **10** and the roller **2** there is present a bead of activator solution **12**.

As the sheet of photographic material **10** is fed through the apparatus by the action of the rotating rollers **1** and **2** it is guided by the tooth **7** from roller **1** on to roller **2**. The sheet of photographic material **10** is shown in the position when it has been guided by tooth **7** on to roller **2** and the trailing edge **13** of this sheet **10** is now trailing against the other tooth **8**. Any of the processing solution **12** which is flicked up by the trailing edge **13** of the photographic material will now be deposited on the tooth **8**. When another sheet of photographic material is passed through the apparatus it will be guided by the tooth **7** which will not have any of the processing solution on it. If any processing solution is deposited on the teeth **8** this will only be transferred to the trailing edge of another sheet of photographic material and streak marks will not be caused.

In FIGURE 3 there is shown a perspective view of the support **9** which carries the two sets of teeth **7** and **8**.

In FIGURE 4 the apparatus again comprises two sets of two rollers **20**, **21** and **22**, **23** which are immersed in two processing solution baths **24** and **25**. Bath **24** contains activator solution and bath **25** contains stabiliser solution. Above the rollers there are arrayed a series of rails **30** and **31**, each rail either carrying on it a set of teeth **26** or a set of teeth **27**. The teeth **26** project further downwards than the set of teeth **27** by an amount sufficient to ensure that it serves to guide the leading edge and body of the material onto the roller and the teeth **27** contact only the trailing edge of the material and serve to guide this edge on to the roller. The rails are so arrayed over the rollers that the teeth **26** are in advance of the teeth **27**.

In FIGURE 5 is shown a rail **30** on which teeth **26** are carried.

In FIGURE 6 there is shown a rail **31** on which teeth **27** are carried.

In FIGURE 7 there is shown a plan view of an apparatus of this type showing how the rails **30** and **31** are arrayed over applicator rollers **20**, **21**, **22** and **23**.

In apparatus of this type the sheet of photographic paper being processed is guided by the teeth **26** over the rollers but the trailing edge of such sheet after it has had processing solution applied to it from a roller trails against the set of teeth **27** and thus any processing solution which it has picked up from the rollers will be deposited on this set of teeth. Therefore, any photographic material being processed in such an apparatus will not have drops of processing solution applied to its leading edge from the projecting teeth **26**.

FIGURES 8–10 show alternative forms of transverse rail guiding means. In the case of all three forms the transverse rail **34** is nearer the entry port of the apparatus and projects further downwards than the rail **35** by an amount sufficient to ensure that it serves to guide the leading edge and body of the material on to the roller and the rail **35** contacts only the trailing edge of the material and serves to guide this edge on to the roller. The direction of travel of the photographic material is indicated by the arrow.

We claim as our invention:

1. In a photographic sheet material processing apparatus of the type which comprises, arranged after a material entry port, at least one set of at least two applicator rollers adapted to be rotatably driven and mounted with their axes disposed horizontally and parallel to each other with the lower surface of each roller dipping into a bath of processing solution there being a material guiding system associated with each roller which is adapted to guide the material on to the roller, the improvement which comprises at least one material guiding system which comprises two downwardly projecting guiding means both of which are located above the centre line of the applicator roller on the material entry port side of the applicator, one guiding means being located nearer the material entry port and projecting further downwards than the other guiding means by an amount sufficient to ensure that it serves to guide the leading edge and body of the material on to the roller and the other guiding means contacts only the trailing edge of the material and serves to guide this edge on to the roller.

2. A processing apparatus according to claim **1** wherein each roller in the apparatus has associated with it a material guiding system.

3. A processing apparatus according to claim **1** wherein the material guiding system defined therein comprises two sets of teeth.

4. A processing apparatus according to claim **3** wherein the teeth are carried on a block.

5. A processing apparatus according to claim **1** wherein the material guiding system defined therein comprises two downwardly projecting transverse rails.

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U.S. Cl. X.R.

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