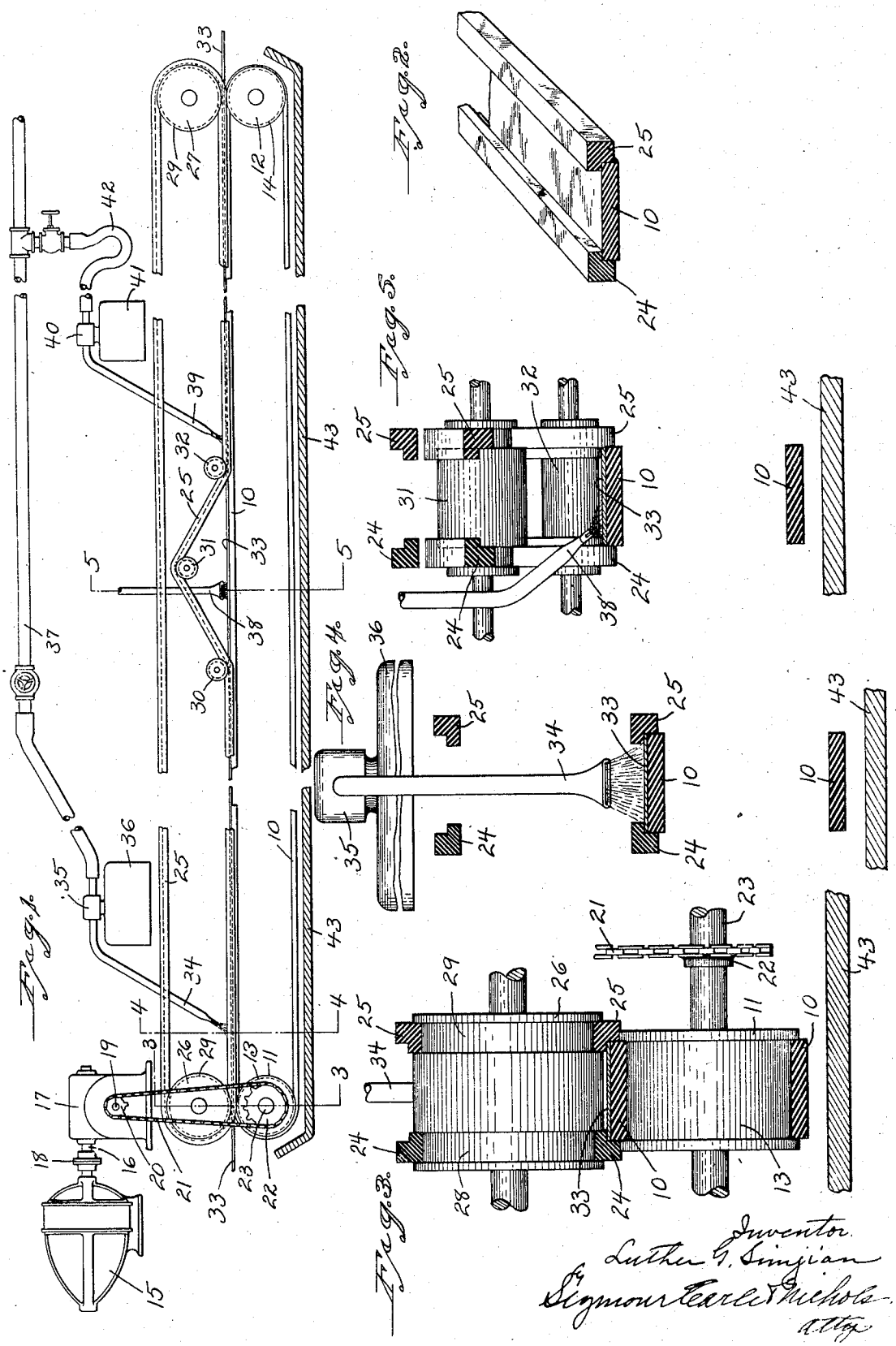
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PHOTOGRAPHIC DEVELOPING APPARATUS

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Inventor
Luther G. Simjian
By Seymour Pearce Nichols
Atty

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LUTHER G. SIMJIAN, OF NEW HAVEN, CONNECTICUT

PHOTOGRAPHIC DEVELOPING APPARATUS

Application filed December 2, 1927. Serial No. 237,168.

This invention relates to photographic developing apparatus, and particularly to apparatus for developing previously exposed photographic films, plates, prints, and like sensitized articles.

The object of this invention is to provide a simple and economical photographic developing apparatus designed with particular reference to accuracy and uniformity of result.

With this object in view, my invention consists in an apparatus for developing previously exposed photographic films, plates, prints, and like sensitized articles, having certain details of construction and combinations of parts as will be hereinafter described and particularly recited in the claims.

In the accompanying drawings:

Fig. 1 is a schematic view in side elevation of a photographic developing apparatus for carrying out my invention;

Fig. 2 is a broken detached enlarged-scale view of a short section of the carrier and retaining-belts of my improved apparatus;

Fig. 3 is an enlarged sectional view in transverse section on the line 3—3 of Fig. 1;

Fig. 4 is a similar view on the line 4—4 of Fig. 1; and

Fig. 5 is a similar view on the line 5—5 of Fig. 1.

The apparatus for carrying out my invention as herein shown consists of a flat flexible endless carrier-belt 10 of rubber or other chemical-resistant material extending between a driving-drum 11 and an idler-drum 12 respectively formed with wide guide-grooves 13 and 14 for the reception of the said belt. The driving-drum 11 just mentioned is rotated at a predetermined rate of speed by means of an electric motor 15 which drives the high-speed shaft 16 of a reduction-gear mechanism 17 through a flexible coupling 18. The low-speed shaft 19 of the said reduction-gear, which latter may be of any approved type, is provided with a sprocket-wheel 20 over which a sprocket-chain 21 runs. The sprocket-chain extends downward and around a sprocket-wheel 22 fixed to the shaft 23 of the driving-drum 11 aforesaid.

For the purpose of retaining films, plates, print paper, or like sensitized articles, in place upon the upper surface of the upper reach of the carrier-belt 10, I employ two relatively-narrow complementary endless retaining-belts 24 and 25, L-shaped in cross-section and respectively adapted throughout their lower reaches to overlap the opposite side edges of the upper reaches of the belt 10 and also the upper surface thereof adjacent the said side edges, as clearly shown in Figs. 3, 4 and 5.

The retaining-belts 24 and 25 extend in parallel paths between two idler-drums 26 and 27, each of which is formed, near its respective edges, with grooves 28 and 29 for the guidance of the respective retaining-belts.

For the purpose as will hereinafter appear, the lower reaches of the respective retaining-belts are, for a short space, removed from contact with the upper reach of the carrier-belt 10, by passing over three idler-drums 30, 31 and 32, as clearly shown in Fig. 1.

For the purpose of illustration, I have shown a long strip 33 of motion-picture film positioned upon the upper reach of the carrier-belt 10 and held in place thereon against both vertical and lateral displacement by the lower reaches of the retaining-belts 24 and 25. It is obvious without further illustration that the said carrier-belt is capable of also carrying plates, print paper, or other thin sensitized articles.

The carrier-belt 10 being driven at a predetermined rate of speed by the electric motor 15, also serves to operate the retaining-belts 24 and 25 by means of the frictional contact between the respective lower reaches of the retaining-belts 24 and 25 and the upper reach of the belt 10. Directly forward of the aligned drums 11 and 26, I position the nozzle 34 of a so-called "atomizer" 35 (of common form), the bowl 36 of which contains a supply of developing chemical, such as hydroquinone. Air under pressure from an air-service pipe 37 is supplied to the said atomizer for ejecting vaporized developer

chemical from the nozzle 34 against the sensitized upper surface of the film 33 immediately after the same passes the drums 11 and 26.

At a predetermined distance from the nozzle 34, dependent upon the speed of the belts, I position a rinsing-water jet 38 to force water crosswise of the film 33 and so rinse the upper surface of the film 33 as to substantially free it of residual developer and thus prepare it for the fixing solution. The said rinsing-jet extends laterally under those portions of the lower reaches of the retaining-belts 24 and 25 which are deflected around the drums 30, 31 and 32 already described.

Directly forward of the rinsing-jet 38 I position the nozzle 39 of an atomizer 40, the bowl 41 of which contains, for the present purpose, a supply of fixing chemical, such as hypo-sulphide, the said atomizer being supplied with air under pressure from the air-service pipe 37 aforesaid by means of the short flexible tube 42.

It is obvious that the number of atomizers employed may be varied to meet different requirements, as may also the nature of the chemicals used.

Beneath the apparatus I position a long flanged tray 43 which serves to catch the rinsing water and also such small quantity of the developing and fixing chemicals as may escape past the opposite edges of the carrier.

In the developing methods of the prior art, the article to be developed has been immersed, either by hand or by automatic devices, into a tank of developing chemical; then rinsed and similarly immersed in a tank of fixing chemical, with the result that the strength of both the developing and fixing chemicals is progressively weakened, so that it is virtually impossible, without very elaborate tests, to forecast the time required to treat sensitized articles subsequently immersed in the said tanks. In accordance with this prior practice, it is necessary to very frequently discard and entirely renew the supply of both the developing and fixing chemicals, which occasions a very considerable loss of both time and materials.

From the foregoing description and the accompanying drawings, it will be seen that an advantageous feature of my invention is that I avoid the saturation of the film, or like absorbent sensitized article, with the chemicals, thereby facilitating the elimination of the said chemicals from the article after the same has been subjected to their action for the required length of time.

I claim:

1. An apparatus for developing films and like photo-sensitized material comprising a relatively-wide endless carrier-belt; a plurality of pulleys therefor; a pair of relatively-narow endless retaining-belts adapted to engage one face of the said carier-belt near the respective opposite edges thereof and provided with lips overhanging the side-edges of the said carrier-belt to prevent the lateral displacement of the sensitized material carried thereby; pulleys for the said retaining-belts; and means for driving the said belts to convey a sensitized article gripped between them from one position to another for chemical treatment.

2. An apparatus for developing films and like photo-sensitized material comprising a relatively-wide endless carrier-belt; a plurality of pulleys therefor; a pair of relatively-narrow endless retaining-belts adapted to engage one face of the said carrier-belt near the respective opposite edges thereof and provided with lips overhanging the side-edges of the said carrier-belt to prevent the lateral displacement of the sensitized material carried thereby; pulleys for the said retaining-belts; means for driving the said belts to convey a sensitized article gripped between them from one position to another for chemical treatment; means for arching the said retaining-belts away from the said carrier-belt to permit the lateral drainage of liquids from the surface of the sensitized material; and an inclined nozzle projecting laterally between the arched portions of one of the said retaining-belts and the adjacent surface of the said carrier-belt.

In testimony whereof, I have signed this specification.

LUTHER G. SIMJIAN.