

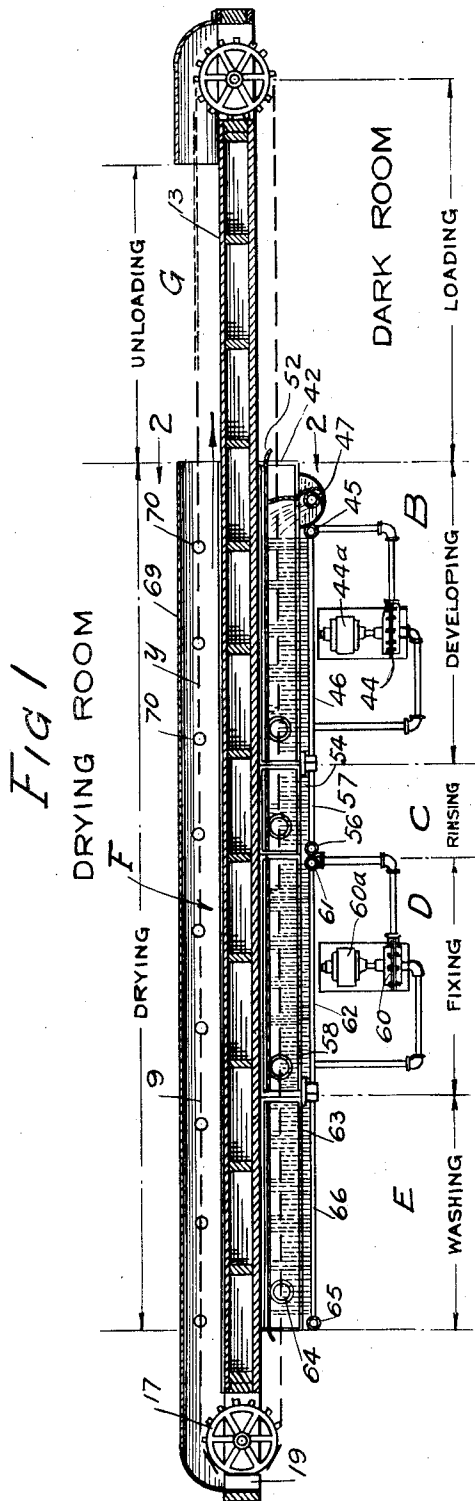
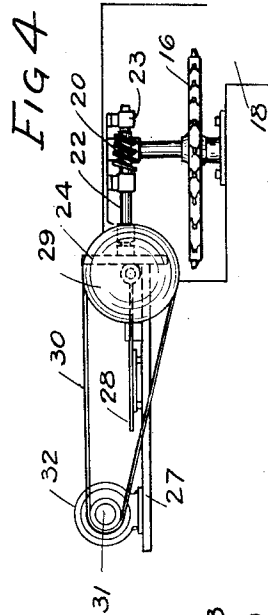
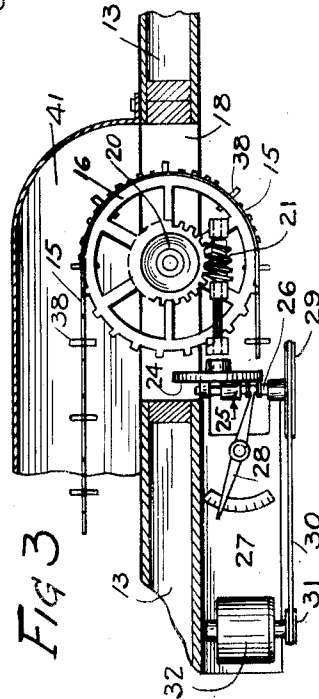
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1,478,385

G. M. DYE

METHOD AND APPARATUS FOR DRYING PHOTOGRAPHIC FILMS

Original Filed Sept. 13, 1919 3 Sheets-Sheet 1



INVENTOR
G. M. DYE

BY HIS ATTORNEY

James F. Williamson

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METHOD AND APPARATUS FOR DRYING PHOTOGRAPHIC FILMS

Original Filed Sept. 13, 1919 3 Sheets-Sheet 2

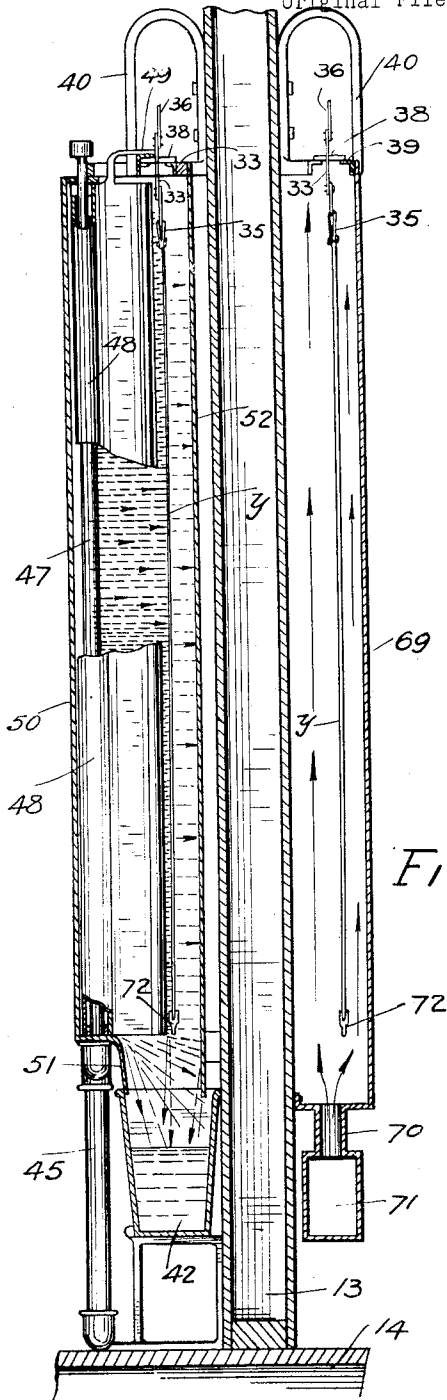


Fig 2

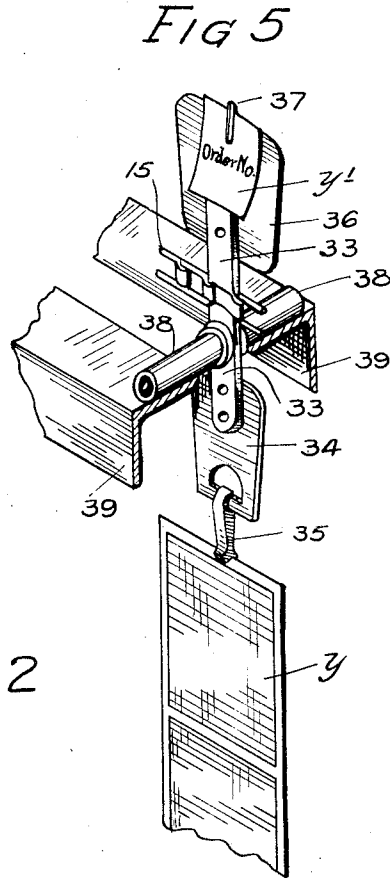


Fig 5

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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR DRYING PHOTOGRAPHIC FILMS.

Original application filed September 13, 1919, Serial No. 323,593. Divided and this application filed September 10, 1921. Serial No. 499,722.

To all whom it may concern:

Be it known that I, GLEN M. DYE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Methods and Apparatus for Drying Photographic Films; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a method and apparatus for drying photographic films and prints and is one part of a series of operations in which the films are developed, fixed, washed and dried as a continuous operation.

It is an object of this invention to dry the washed films by progressing the same through a drying chamber while suspended from a carrier to which they have been previously attached and from which they will be removed after passing through said chamber.

It is another object of this invention to provide an apparatus of novel structure by means of which the films can be suspended in spaced relation and continuously progressed into and through the drying chamber.

This application is a division of my co-pending application filed September 13, 1919, for photographic developing apparatus, S. N. 323,593.

The above objects and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings which illustrate one form of novel apparatus suitable for carrying out the here-indisclosed method, and in which,

Fig. 1 is a view in horizontal section illustrating the complete apparatus for developing and drying the films;

Fig. 2 is a vertical section of the apparatus taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged horizontal section of a portion of the apparatus; Fig. 4 is a side elevation of the mechanism shown in Fig. 3, some parts being removed;

Fig. 5 is a fragmentary perspective view showing a portion of the film carrier and associated parts; and

Fig. 6 is a rear elevation of the apparatus some parts being sectioned and some parts being broken away.

Referring to the drawings, the mechanism of my improved apparatus is arranged partly within and partly outside of a dark room, and usually the light and dark rooms will be separated by a wall or partition 13 extending from a floor 14. The film carrier which is preferably in the form of an endless sprocket chain or link belt, is arranged to travel in a horizontal plane through and along the opposite sides of the partition 13 and, as shown, the sprocket chain 15 which affords said carrier, is arranged to travel over sprocket wheels 16 and 17 that are located in film passage-ways 18 and 19, respectively, formed in the said partition and extended down quite close to the floor or far enough to permit the film to pass there-through when suspended from said sprocket chain or carrier belt. Said sprockets 16 and 17 (see particularly Fig. 1), are journaled to suitable bearings on the partition 13, and the shaft of the sprocket 16 is shown as provided with a worm gear 20. Worm gear 20 meshes with a worm 21 on a shaft 22 journaled in suitable bearings 23 fixed to the partition 13. At its extended end, shaft 22 has a face friction wheel 24 with which co-operates a peripheral friction wheel 25 that is carried by, but slidable on a small counter shaft 26, journaled in suitable bearings on a supporting bracket 27 secured to partition 13 (see particularly Fig. 2). Friction wheel 25 is adapted to be adjusted radially of friction wheel 24, and thereby set for the transmission of different speeds, by an adjusting lever 28 pivoted to bracket 27. At its outer end, shaft 26 has a sheave 29. A belt 30 runs over sheave 29 and over a sheave 31 on the armature shaft of a small electric motor 32 shown as supported on the bracket 27. By the means just above described, the link belt 15 is adapted to be continuously driven at any desired speed from motor 32.

In the drawings, the films in the form of strips y are arranged to be spaced apart and carried by the carrier belt 15, and the said belt is provided with means for detachably holding the same, and preferably also, for detachably holding order number tabs y^1 . This means, as shown, comprises upright metal arms 33 secured to certain of

the links of said belt and provided at their lower ends with flat plate-like heads 34 equipped with spring clamps 35 for directly gripping the upper edges of the films. At 5 their upper ends, said arms 33 are shown as provided with flat plates 36 to which the order tabs γ^1 may be detachably secured by spring clips 37, or the like.

To support the carrier belt between sprockets, the arms 33 are shown as provided with 10 forwardly and rearwardly projecting rider pins 38 that are arranged to travel over laterally spaced parallel horizontally extended rails 39. Said rails 39 are located in pairs 15 on opposite sides of the wall 13 and, as shown, are rigidly secured to the prongs of inverted U-shaped hanger brackets 40, which, in turn, are rigidly secured to the said wall 13 (see particularly Figs. 5 and 6). These 20 rails receive the rider pins 38 as they pass from the one sprocket and guide the same to the other sprocket, and this, as already indicated, takes place on both sides of the wall 13.

The film and the order number tabs will be applied to the carrier on that portion of the chain that is moving through the loading zone marked A on Fig. 1. From loading zone A, the films will be carried through 30 developing zone B, thence, through rinsing zone C, thence, through fixing zone D, and thence through washing zone E. From washing zone E, Fig. 1, the films will be carried through the rear opening of the wall 13, thence through drying zone F and thence 35 through unloading zone G, from which latter, the fully developed films will be removed, all as will hereinafter more fully appear.

40 As the washed films pass from washing zone E, they are carried through the opening 19 in wall 13 and through the drying zone F. The drying zone is within a housing 69 secured to wall 13. This housing is 45 open at its top, but at the bottom is connected by short air tubes 70, to a hot air pipe 71, which, in practice, will be connected to a suitable source of hot or warm air supply, such as a fan connected, in turn, to a heating 50 chamber.

The operation already generally indicated, may be briefly summarized as follows:—

55 The films γ , at their upper ends, are attached to the continuously traveling carrier belt by the clips 35, as they pass through the loading zone A. To cause the film to hang straight down, clip-like weights 72 may be applied to the lower ends thereof. From 60 loading zone A, the films pass in regular order through the developing zone B. From the developing zone, the films pass through rinsing zone C where the surplus developing liquid is washed therefrom, and from thence, they pass into and through a fixing zone D.

From the fixing zone D, the films pass through the washing zone where the surplus fixing liquid will be washed from the films. Next, the films pass through the long housing 69 of the drying zone F where they are 70 subject to the currents of warm air so that when the films pass from the drying zone they will be dried and fit for removal as they are carried into the unloading zone G. In this way, all of the operations incident 75 to complete development of the films are accomplished automatically, the only hand operations being those required to attach the films to the carrier belt and to remove the same therefrom. 80

This machine is capable of rapidly turning out a large number of films and is, therefore, especially adapted for use where a very large amount of film development is to be done and where small cost per film is 85 of high importance.

The air for drying should not be hot but quite warm and dry.

As already indicated, this apparatus or machine may be used for complete development of either negatives, using the term 90 in the ordinary sense, or what is usually designated as photographic prints, post cards, or the like, having photo-sensitive faces on which pictures are printed. 95

From the above description it is seen that applicant has provided a simple and efficient method and apparatus for drying the films as a continuous process. The identification 100 of the films according to the owners and to the job and lot numbers, is usually maintained by the order numbers being placed directly on the film carriers and the films progress continuously through the drying chamber. The carrier will be loaded and 105 unloaded during its movement which is quite slow, and will thus be moved repeatedly through the drying chamber and the labor of carrying in and out drying racks will be eliminated. It is also unnecessary to 110 carry the films in and out of the drying chamber as they are moved therein by the carrier and again carried out by the same. The speed of the carrier can, as described, be regulated as desired and the conditions 115 in the drying chamber can be maintained in the proper state to efficiently dry the films. The method and apparatus effect a great saving of time and labor in the commercial handling of a large number of films. 120 Establishments which now develop films for amateur photographers frequently do an immense volume of business, and applicant's invention forms a great advance in the art of handling these films. 125

It will, of course be understood that various changes may be made in the form, details and arrangement of the apparatus and in the steps of the process without departing from the scope of applicant's invention, 130

which, generally stated, consists in the matter shown and described and set forth in the appended claims.

What is claimed is:

5 1. The method of drying photographic roll films which consists in securing the upper ends of the same at spaced points on a traveling member moving in a horizontal plane, weighting the lower ends of said
10 films so that they depend singly and maintain their spaced relation, progressing said members into, through and out of a drying chamber.

2. A drying apparatus for photographic
15 roll films having in combination, a drying chamber, spaced tracks at the top thereof, rollers movable on said tracks having means projecting thereabove, an endless chain secured to said means, and driven by a
20 sprocket having a substantially vertical axis, spaced means depending from said

rollers and between said tracks, and clips adapted to hold the upper end of a depending film while the same moves into and out of said chamber.

25 3. A drying apparatus for photographic films having in combination, a narrow vertical drying chamber open at its ends, sprocket wheels mounted in horizontal planes at the top of said chamber at the ends thereof, an
30 endless carrier moving over said sprockets in substantially one plane, spaced supporting means secured to said carrier beneath the same, a track beneath said carrier on which said supporting means move, means
35 connected to said supporting means and adapted to clamp the end of and hold a film in depending relation therefrom, and means for moving said endless carrier to progress
40 the films through said chamber.

In testimony whereof I affix my signature.

GLEN M. DYE.