No. 623,837. Patented Apr. 25, 1899.

A. SCHWARZ.

PHOTOGRAPHIC DEVELOPING APPARATUS.

(Application filed May 7, 1897.)

(No Model.)

Fig. 3.

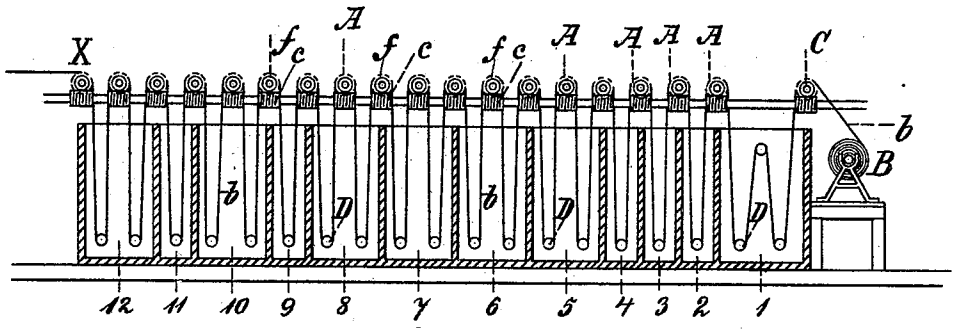
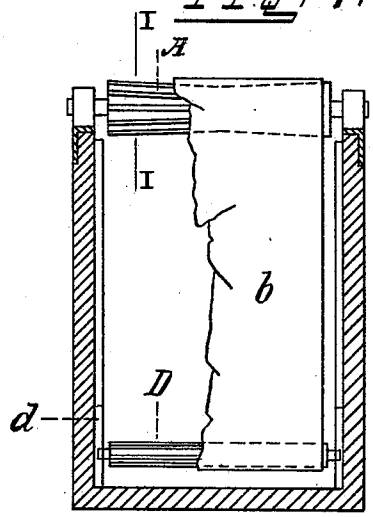


Fig. 1.

Fig. 4.



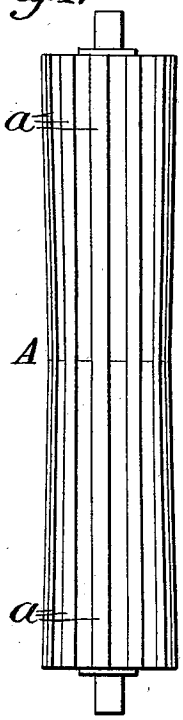


Fig. 2.

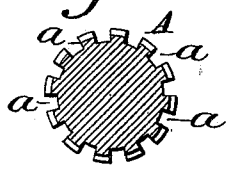




Fig. 5.

Witnesses.
J. C. Lebret.
O. Block

Inventor.
Arthur Schwarz,
By Wm. Wm. de Vos.
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR SCHWARZ, OF BERLIN-SCHÖNEBERG, GERMANY.

PHOTOGRAPHIC DEVELOPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 623,837, dated April 25, 1899.

Application filed May 7, 1897. Serial No. 635,502. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR SCHWARZ, a subject of the German Emperor, residing at Berlin-Schöneberg, Germany, have invented certain new and useful Improvements in Developing Apparatus for Photographs, (for which I have obtained patents as follows, to wit: in Belgium, No. 127,616, dated April 30, 1897; France, No. 266,019, dated July 30, 1897; Austria, No. 47/4,876, dated November 18, 1897; Italy, No. 44,543, dated June 30, 1897; Switzerland, No. 14,434, dated April 12, 1897; Luxemburg, No. 2,808, dated April 5, 1897, and Germany, No. 88,252, dated November 28, 1895,) of which the following is a specification.

My invention relates to an apparatus for developing, toning, and fixing photographs in large quantities.

In the apparatus hitherto used the feeding of the moist paper through the several baths presents the disadvantage that special feeding mechanisms are required that increase the cost of the plant and also the working expenses, as owing to their operation in the several solutions such feeding mechanisms are exposed to great wear.

I have devised an apparatus whereby the feeding mechanisms operating in the baths are done away with, and to this end I have provided my developing apparatus with peculiar feeding-rolls of a simple and cheap construction. My invention is illustrated in the annexed drawings, making a part of this specification, and wherein—

Figure 1 shows an elevation of the new feeding-roll. Fig. 2 shows a transverse section of same. Fig. 3 shows a longitudinal section of the apparatus provided with the new feeding-rolls. Fig. 4 shows a transverse section of one of the baths on an enlarged scale, and Fig. 5 shows an end view of the feeding-roll on the same scale.

As shown in Fig. 1, the roll A is provided over its entire length with grooves *a*, and the roll is not cylindrical, but is slightly tapering toward the center from both ends. It will be observed that the grooves *a* converge toward each other from opposite ends of the roll toward the center. These rolls will hold the paper when it reaches same from the bath with a slightly-lateral pull, sufficiently strong to prevent the formation of folds without injuring the paper. As the roll A has a larger diameter toward the ends than in the center and the whole roll turns uniformly the ends have a larger peripheral speed than the center, so that they exert a certain pull on the corresponding sections of the paper. As the diameter becomes smaller toward the center the peripheral speed also decreases and is smallest in the center. The pull on the sections of the paper varies in accordance therewith, and consequently the paper is advanced by the rolls absolutely without any folds being formed. These rolls are mounted above each bath, as shown in Fig. 3, and the exposed paper *b* drawn from the reel B over the roll C into bath 1 and after passing through same is conveyed by feeding-roll A into bath 2, and so on until it is fed through the entire series of baths 1 to 12 by the propulsion of the feeding-rolls A and carried off over a roll X. The loops of paper hanging down into the baths are weighted down by means of small rolls D, the pinions of which are housed in longitudinal slots *d*, Fig. 4, provided in the side walls of the baths, so that the length of the loop of paper in the bath may be changed at will.

The feeding-rolls A are rotated with equal speed by a common shaft E, preferably by the medium of a worm *c* and worm-gear *f*, so that the strip of paper is fed without any guiding device through the baths and is only weighted down by the small rolls D, so as to obtain a perfect immersion in each bath.

It is obvious that the rolls D merely rotate and are not subjected to any strain whatever. Consequently they can be made of a material not affected by the liquids and solutions in the several baths.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An apparatus for developing photographs consisting of a series of baths containing the required solutions, and longitudinally-grooved rolls rotating at the same speed, arranged over each bath, said rolls decreasing in diameter toward the center from both ends, and the grooves therein converging toward each other from opposite ends of the roll toward the center substantially as described.

2. In an apparatus of the class described a longitudinally-grooved feeding-roll decreas-

ing in diameter toward the center from both sides, the grooves therein converging toward each other from opposite ends of the roll toward the center substantially as and for the purpose described.

3. In an apparatus for developing photographs, a feeding-roll formed with longitudinal grooves converging toward each other from opposite ends of the roll toward the center thereof, substantially as and for the purposes described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ARTHUR SCHWARZ.

Witnesses:
W. HAUPT,
HENRY HASPER.