Emulsion Time

Blade Aperture

at 3 mm.

I. 1 1/2 sec.

II. 4 sec.

III. 7 sec.

All have some

over step in delineation. Aug. 17, 79.
Rochester, N. Y., Oct 18, 1912

Mr. Geo. Eastman,

City.

TO CAMERA WORKS,
EASTMAN KODAK COMPANY, DR.

317-337 State Street.

Have Kroedel make a part as per attached sketch. (20560) 5 25

EASTMAN KODAK CO.

R. A. YD

Jan 4, 1913
I paid

Euler Cashier
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DIBDIN’S PENTANE AIR-GAS STANDARD.

DESCRIPTION OF THE APPARATUS.

The apparatus consists of a specially-constructed Sugg’s Argand Burner, fitted with a suitable chimney, to burn carburetted air. The burner is mounted upon a rectangular frame supporting two coloured glasses, one on either side of the burner, on which are scratched boxing lines for adjusting the flame to its proper height. Mounted on the frame, in front of the burner and between the two coloured glasses, is a screen so arranged as to cut off a portion of the flame at the top, leaving the remainder of the flame visible, which is then equal to 10 candles. The burner is so constructed as to allow of slight variations in the height of the flame above or below the boxing lines, without interfering with the light emitted through the screen. The burner, frame, and screen are mounted upon a pillar attached to the Carburettor by means of a well ground-in plug, so that, when necessary, this part of the apparatus may be removed. The pillar is furnished with a quadrant cock for regulating the flow of the gas with rapidity and precision. The Carburettor is so constructed, that the air entering in by the cock and nose piece (see left-hand side of illustration) on the Carburettor has to traverse a coil-shaped passage until it reaches the centre of the Carburettor, whence it finds its way up the pillar to the burner. The Carburettor is fitted with a pentane line regulator for maintaining the proper level of the Hydro-Carbons in the Carburettor, consisting of a bottle-shaped glass reservoir with ground-in stopper. The reservoir is mounted on a pillar, with a special cock communicating with the Carburettor by means of a specially-constructed dip-pipe. To charge the Carburettor, the ground-in stopper is removed and the cock beneath turned on; the pentane is then poured in by means of a suitable funnel until the proper level in the Carburettor is reached; this will be seen by the sight hole on the side of the Carburettor, a diamond scratched line on the glass showing the pentane line. The cock is then turned off, and the glass reservoir charged about two-thirds full of pentane. The ground-in stopper is then replaced, and the metal cock below the reservoir turned on. The instrument is then ready for use, and is supplied with air by means of a small holder, specially constructed for the purpose, having a capacity of one cubic foot.

PRICES.

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<td>1 ft. Air-holder for same</td>
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SPECIAL NOTE.—This can also be made as a 10-Candle Standard. Price, with 1-ft. Air-holder complete, £16.7.0.

VINCENT WORKS, WESTMINSTER, S.W.
WILLIAM SUGG & Co., LIMITED.

SUGG'S 10-CANDLE GAS STANDARD.

For use with ordinary Gas, and can be fitted to any Photometer shown in this List.

PRICE, £5.5.0

SPECIAL MEMO.

THIS STANDARD IS ALSO MADE IN THE FOLLOWING SIZES:

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VINCENT WORKS, WESTMINSTER, S.W.

Eastman Kodak Company: Patents
Gentlemen,

We are very much obliged for your kind order to supply
a Bibdin's Pentane Argand Lamp which we have put in hand for early
delivery.

We beg to hand you enclosed an Illustrated description
of the apparatus for which you will see that the price complete with
one cubic foot Air-holder is £14 :5: 0. We presume that you wish us
to supply the Air-holder also, as the Burner would not be complete
without it. We will send you invoice as requested in due course.

With compliments,

Yours faithfully,

WILLIAM SUGG & Co. Ltd.

W. Brown
New York, N. Y., Sept. 10, 1901.

Mr. Frederick A. Anthony,
36 Fifth Avenue, City.

Dear Sir:

Re: Goodwin Film Patent No. 610861 - Sept. 15, 1896.

In compliance with your request I have examined the mass of papers furnished by Mr. Pell, and also a large number which I have received from Washington, in order that I might make a general report relative to your embarking in the manufacture of the Goodwin film, and also concerning litigation against the Eastman Company.

Goodwin's application was filed May 2, 1887; it was not issued until Sept. 15, 1896, 11 years and 4 months thereafter. During its pendency in the Patent Office it encountered well-nigh every experience that such an application is incident to, and the papers are consequently exceedingly voluminous and involved, and in certain respects confusing. I will, therefore, in this report, confine myself to generalities only, because if I should do otherwise it would be so voluminous as to be unbearable, and perhaps scarcely intelligible. I report as follows:

FIRST. Relative to your embarking in the manufacture of this film:

There can be no doubt, I think, that you may carry on the manufacture of this product, provided you adhere to the Goodwin process and produce the Goodwin article,
without interference by anyone; because he appears to be the first to have produced a satisfactory film of the character in question, adapted to be used in roll-holders and having the characteristics of the present commercial film, by the practice of his or any other process.

I wish to say, however, that from certain statements that appear in the patents and other matter I have read, I imagine there may be difficulties in the production of the Goodwin film commercially, which do not appear on the surface but which will possibly be encountered when you commence your actual manufacture. I cannot state these things with positiveness, but it will be some guide to you if I allude to them.

Goodwin suggests that the film can be practically made by dissolving nitro-cellulose in nitro-benzene, which he gives as his preferred non-hydrous and non-hygrosopic solvent, and diluting the resulting solution by adding alcohol or other hydrous and hygrosopic diluent, and by then simply flowing the resulting liquid over a smooth plate, preferably glass; and that the sensitizing emulsion may then be flowed upon the nitro-cellulose support thus made, either before it has been stripped from the glass plate or afterwards, as preferred.

Now, I gather that the foregoing will not turn out to be the fact in the practical commercial manufacture of these films, because the nitro-cellulose solution, if of a proper character to make a hard, smooth, impervious film,
adapted to the purposes desired, will dry so hard upon the glass plate that when the attempt to strip it is made, either before the sensitized coating has been applied, or afterwards (more especially afterwards) the force required will be so great as to distort the film by stretching it and causing it to assume a wavy or uneven surface, which prevents its attaining the proper focal plane in the camera, etc.

Also, there is possibly another difficulty which Goodwin apparently had not encountered, at least which he does not provide a remedy for. It is that the sensitized emulsion will not always adhere to the surface of the nitrocellulose film, but will at times separate therefrom, causing blisters and other defects.

Eastman obviates the first difficulty by rubbing the surface of his glass plate, after each application of the nitrocellulose solution, with a weak solution of mineral wax in benzine, or a weak solution of beeswax, which will weaken but not destroy the hold of the film upon the glass plate, making it uniform, though slight, throughout the entire surface. It is essential that the film shall maintain close contact with the surface of the glass but yet be separable therefrom without much strain as will distort it. I do not find that this idea has been patented by the Eastman people or anyone else.

Eastman obviates the second difficulty and causes uniform adhesion of the sensitized emulsion (gelatio-
argentic emulsion) to the surface of the nitro-cellulose film by washing the face of the film with clear water to which two or three percent of silicate of potash or of soda has been added. This is patented by Reichenbach 479,305, July 19, 1892.

Do not be misled by the above. The incidents I refer to I gather chiefly from the patents, arguments, testimony, &c., of Eastman, Reichenbach and others who were associated with him in 1889 and 1890, and at that time he was using a very considerable proportion (about 40%) of camphor, with fusel oil, &c., and his composition was therefore essentially different from Goodwin's, for he used no camphor; and possibly, therefore, Eastman encountered difficulties which Goodwin did not encounter, and consequently there was no occasion for the latter supplying remedies for them.

In addition to the foregoing, there is a mechanical feature which suggests the statement made by Eastman that no one can commercially make the goods without infringing his mechanical patents.

The point is this. I gather that the nitro-cellulose solution capable of making these supports will not flow of itself with the smoothness and evenness necessary to constitute a satisfactory film. In other words, that it is different from a gelatine-argentic emulsion which can be coated on paper or other suitable surface by simply bringing the same together in such manner that the...
emulsion may flow over the surface. On the contrary, it is necessary, in order to produce a merchantable support from nitrocellulose that there be a perfectly level and horizontal surface, such as the surface of an extended glass plate, and that the nitrocellulose emulsion or solution be deposited upon such surface through the instrumentality of a moving receptacle for the solution, such as a traveling reservoir, through a slit or opening in which the solution descends, which is then immediately spread over the said level surface in a smooth, uniform, thin film or layer, by means of a doctor blade carried by the reservoir. Goodwin first suggested the application of the fluid to a glass plate, but he did not disclose any mechanism for so doing.

If it shall turn out to be the fact that the above is true and that this liquid can not be satisfactorily applied by brushes, or by the dipping process, or in any such manner, then you maybe driven to use substantially such a machine as Eastman has patented: and I find he has pretty strong claims covering the same. For instance, claim 1 of Eastman’s patent 471,469, March 22, 1892 reads:

"In a machine such as described, the combination of a bed plate having a substantially flat surface, and a travelling coating apparatus mounted and reciprocating upon guides parallel with the surface of the bed plate, substantially as described."

Also claim 4, which reads:
"In a machine such as described the combination with a bed plate of a traveling coating apparatus provided with a hopper for the fluid, having a discharge orifice, and a spreading blade supported in rear of said discharge orifice and extending transversely across and parallel with the surface of the bed plate, substantially as described."

It would be easy to make an apparatus that would avoid these claims and yet produce satisfactory results, were it not that the apparatus, as Eastman and his experts claim, has to move with the greatest exactness, because the thickness of the nitro-cellulose film or support is only two thousandths of an inch; the superposed sensitized material being from one-half to one thousandth of an inch. I believe now, however, somewhat heavier films are used. And these dimensions being so small require the greatest accuracy and smoothness in the working of the apparatus, and you may find it difficult to design an apparatus which will enable you to commercially compete with Eastman and yet escape his patents. I think this can be done, however: indeed, Mr. Pell informs me that the Celluloid Company, the old Blair Company, and others have made and are now making these films, which he understands they sell to photographers for coating, and they must use some apparatus other than that covered by Eastman's patents, or he would stop them.

The Eastman machine patents disclose certain features in addition to the above, whereby he possibly effects some saving in the cost of manufacture; but in my judgment..."
all such details could be easily substituted by others which would be equally advantageous and would not infringe any of his claims.

Considering now the more important question of infringement upon the Goodwin patent by the Eastman Company.

This necessitates a statement which I will make as brief as possible, of the history of the Goodwin case while in the Patent Office.

The original Goodwin application as filed May 2nd, 1887, sets forth all the essentials of the patent as issued. In it the statements of the original are considerably elaborated in order to differentiate it from the old art, but, as stated, in the original the invention was clearly and sufficiently set forth.

The original application referred to the use of the product in various arts, and it also suggested certain equivalent materials which might be used in place of nitrocellulose, but finally the case was restricted to a nitrocellulose sensitized film for photographic purposes only.

There is no objection to this. The inventor elected for the sake of greater certainty and protection to limit himself to a specific product for a specific purpose. This has the effect of strengthening his position, rather than otherwise.

The original application after reciting the demand for a light, flexible, transparent, non-breakable substitute for glass as a support for the sensitized surface in
photography, something that would be adapted to use in a
roll-holder, states that the object is attained by dis-
solving nitro-cellulose in nitro-benzene, or equivalent
solvent other than the solvents used in the manufacture of
collodion (i.e., alcohol, ether, &c.), and then by dilut-
ing the resulting syrup-like solution in alcohol or other
diluent or extender. The fluid thus obtained is to be
flewed over a suitable surface, such as glass, and then
allowed to dry; and after drying it is to be stripped from
the glass and used as a support for the sensitized surface
in all of the processes of photography. The sensitized
emulsion is to be applied to the celluloid support either
before or after it is stripped from the glass or other
surface. It also states that the nitro-cellulose film
may be re-enforced on one or both sides by gelatine or
other coating to strengthen and protect it if desired.
Also other modifications, which are here unimportant,
are fully set forth. The original claims were exceedingly
broad.

The application was rejected by the Examiner upon
a number of references, which were duly replied to by the
applicant, but since the proceedings were somewhat delayed
nothing of great consequence arose until 1889. Then an
interference was declared between this Goodwin application
and a subsequently filed application of Eastman and another
one of Reichenbach, making a tripartite interference.
In due course the interference was dissolved in Goodwin's favor, so far as Reichenbach was concerned, because of a Disclaimer which Reichenbach filed by which he conceded the broad claims to Goodwin; and later on the Examiner, of his own motion, dissolved the Eastman part of the Interference, alleging that he had discovered a new reference which precluded the grant of a patent either to Eastman or to Goodwin, having claims as broad as those then presented by them respectively.

After this there was no reinstatement of the Goodwin-Eastman interference, because Eastman restricted the scope of his claims. Thus he also, although not as a matter of record, conceded the broad claims to Goodwin.

As soon as Reichenbach filed the Disclaimer and limited himself to the specific claims for his special ingredients, the Reichenbach patent 417,902 issued to him. All of its claims, however, rely for patentable novelty upon the inclusion of camphor (and some of them camphor and fusel oil) in the fluid solution of nitro-cellulose.

As soon as Goodwin ascertained that this patent had been granted to Reichenbach, he forthwith hastened to Washington to ascertain how it happened, with his application still pending there and with a decision in his favor on the interference.

In an affidavit made November 8, 1896, Goodwin swore that he was informed by the Examiner that the issuance of the Reichenbach patent was an inadvertence; and
that the Examiner advised him to incorporate in his application the five claims of the Reichenbach patent and to then ask to be put in interference, that the matter might be thrashed out on those claims. This was bad advice, and Goodwin's counsel so advised him, but finally, on Goodwin's insistence, he reluctantly yielded and Reichenbach's five claims were inserted, word for word, in Goodwin's case and an interference demanded.

This you will see not only magnified the importance of the Reichenbach patent, but also put on Goodwin the burden of showing that he conceived prior to Reichenbach and distinctly contemplated the use of Reichenbach's special ingredients—to wit, the employment of camphor and fusel oil, or their clear equivalents; and if he could not do this, then it would tend to solidify the Reichenbach patent as an invention separate and distinct from that of Goodwin; and it also would have the effect of shifting the burden of proof, because Goodwin's case as originally filed contained no distinct suggestion of the use of these ingredients, and he would have to establish by his evidence a right to the insertion thereof.

There were other reasons why this procedure was unfortunate, which need not be referred to.

In due course, and after a great deal of altercation, the Commissioner took the ground I have above alluded to, and Goodwin was compelled to take the position of junior applicant on this specific camphor &c. issue, and all
burdens were thrust on him. Thereupon, as the papers disclose, Goodwin dropped this interference, with the result that Reichenbach retained his patent as originally issued, with the said specific claims in it, and Goodwin was compelled to remove them from his case before it would be again considered by the Office. The papers contain an excuse by Goodwin that he was compelled to do this because of financial pressure which precluded him from fighting the case.

(This camphor matter will be considered later on by itself, for it is important.)

These proceedings occurred mostly in 1890. Thereafter, for a period of seven years the case lay in the Patent Office, with infrequent action by either side, the Examiner persistently holding the position that there was nothing patentably new, that the specification was defective, that Goodwin was striving to enlarge his invention, that he was continually presenting "new matter"; that the process and product were antagonistic to each other-- and a dozen other objections: to which Goodwin as persistently replied that the Examiner was wrong. And in all this Goodwin was clearly right. The conviction is inevitable that some one was behind the Examiner in all these obstructive measures. This, however, cannot be even suggested, nor in any manner gone into, because it reflects on the Examiner.
Finally in 1890 Godwin apparently became satisfied that he would accomplish nothing with the Examiner, and took an appeal to the Board of Examiners-in-Chief.

The argument presented on Godwin's behalf on this appeal is a most exhaustive treatise on the whole subject of transparent films or pellicles. The entire prior art which had been at that time cited by the Examiner was thoroughly discussed and the patentable novelty of Godwin's invention well established. He showed, in a manner which I think will be satisfactory to the court (as it proved satisfactory to the three judges who constitute the appellate tribunal--i.e., the Board of Examiners-in-Chief---and who are quite competent to pass upon these matters) that the photographic world had been for over 40 years earnestly seeking some substitute for glass; that hundreds, probably thousands, of persons skilled in the art had been for years attempting the production of such substitutes, and that films of all sorts had been used—films of collodion, of gelatine, of hardened gelatine, collodion and gelatine; shells, paper treated in all sorts of ways, compressed celluloid, sliced celluloid—indeed, every conceivable composition and material. Yet there never had been, prior to his time, anything produced which, as matter of fact, an adequate substitute for glass. And he presented samples of his material, and samples of the Eastman Company's material which at that time had been upon the market for some time.
The decision of the Board is quite important because, in my opinion, it forewarns the conclusion that the court will arrive at if the matter shall ever be presented there; and I will refer to it somewhat at length.

The judges, after taking up certain preliminary objections which had been strenuously urged by the Examiner in rejection of Goodwin's application, and disposing of them in Goodwin's favor, proceed as follows:

"As to the question of the patentable novelty of the claim there is some room for doubt. It, however, appears from the affidavit filed in connection with the motion to dissolve the interference between this applicant and Reichenbach, and from the depositions of witnesses taken in the case of the Celluloid Mfg Co., the Eastman Dry Plate & Film Co. (to which the Examiner refers in his statement), that up to the year 1888 or 1889 there was upon the market no satisfactory substitute for glass as a support for a sensitive film, though such support had been eagerly sought for.

"The affidavit of George Eastman shows that his attention was particularly drawn to this matter in the latter part of the year 1888 by some solutions of pyroxyline which were furnished his Company by the Celluloid Varnish Co., a licensee of the Celluloid Company, and that he tried to make a support for films by flowing these solutions upon a flat surface and then drying them. The correspondence between him and the Celluloid Varnish Co. shows that he was furnished with a variety of samples of varnish, all of which, however, proved unsatisfactory until the invention in 1889 of the film patented to Reichenbach. Since that date the Reichenbach film, and another referred to in the record as the Blair film, have come into enormous commercial use.

"It is clear that there was in 1887, when this application was filed, a demand for and an earnest seeking after a celluloid-like film support for photographic emulsions, but that at that time neither the Eastman Company nor the Celluloid Mfg Co. was able to furnish any such material. This consideration is in
itself sufficient to indicate that the information in possession of those familiar with this art was not at that time such as to furnish a solution of the problem then presented.

"Numerous patents, and publications in the photographic journals, are referred to in the Examiner's answer as indicating that photographic films and the processes of making them such as are now claimed by the applicants were known in the art. All of these citations, however, are satisfactorily disposed of for the reasons stated in the applicant's brief."

Here follows an extended consideration of the more important of the prior references, and a consideration also of the testimony given by the experts in the case of the Celluloid Mfg. Co. vs. The Eastman Dry Plate & Film Co. and in the preliminary injunction proceedings in that case. The consideration concludes as follows, specially referring to Mr John H. Stevens, who was recognized by the Court as an authority on celluloid manufacturers, and the Farboc British Patent, the reference particularly relied upon:

"Yet this expert in the art failed to obtain from "this patent (Farboc British) sufficient suggestion to "enable him to produce satisfactory film. If the "description of this British patent was sufficient to "enable those skilled in the art to produce a satisfact- "ory film, it is inconceivable that in 1886 theCellu- "loid Varnish Co. should not have produced it. We find "in this patent no suggestion that the film of pyroxylene "resulting from the drying of the nitro-benzole solution "was of sufficient strength to enable it to be removed "from the surface on which it had been flowed, or that "it would prove a sufficient support for a photographic "emulsion to be subsequently applied thereto. The in- "formation amounts to nothing more than this: that "nitro-benzole was solvent of pyroxylene and that with "
"It a smooth sheet of collection-like material on a 
suitable surface could be obtained. This accounts 
"to no more than a suggestion, and, as was said in 
"The law requires something beyond a mere suggestion 
"to defeat a patent. Prophecy will not do; facts, 
"not theories, are needed."

"Neither this patent nor any of the other references 
cited afford sufficient information to enable one 
"skilled in the art to carry the invention into prac-
tical use, and this is the essential prerequisite of 
"a prior publication relied upon as an anticipation. 
"See Benez vs. Andrews, 182 U.S. 46."

Then the court considered quite at length the at-
tacks made upon Goodwin concerning the impracticability 
of his process and ingredients, and the reply thereto 
presented by Goodwin. This line of consideration con-
cludes with the following:

"From what has been above stated with reference to 
the history of the development of this art, it appears 
"that in 1867 when this application was filed there was 
"known to those working in this art no satisfactory 
"substitute for glass as a support for the photographic 
"emulsion. Such a substitute had long been sought for 
"but with no success. At this time the applicant ap-
pears in the patent office with his invention, which 
"is supported not merely by the fact of his filing an 
"application containing a description of it, but by af-
"firmatory and exhibits showing that at that date the 
"invention had been completed by the actual production 
of satisfactory photographic film supports.

"It further appears that those most skilled in the 
"art, men who were experts in their particular line, not 
"merely presumably, but actually familiar with the state 
of the art, were unable to successfully produce the 
"film so much desired.

"Under these circumstances the law applicable to 
"this case is clearly stated in Washburn & Eben Mfg Co. 
"vs. Best 'Em All Barbed Wire Co., 58 O.G., 1566, where 
"the Supreme Court said:
"In the law of patents it is the last step that wins. It may be strange that, considering the important results obtained by Kelly in his patent, it did not occur to him to substitute a called wire in place of the diamond shaped prong, but evidently it did not; and the man to whom it did ought not to be denied the quality of inventor. There are many instances in the reported decisions of this court where a monopoly has been sustained in favor of the last of a series of inventors, all of whom were groping to attain a certain result which only the last one of the mass seemed able to grasp.

Even though it was known that nitro-benzene was a solvent of pyroxyline, and that pyroxyline solutions could be flowed on glass plates, and that films or pellicles of celluloid and of solutions of celluloid had been used, and that other hygroscopic and non-hygroscopic elements, singly and jointly, had been used to dissolve nitro-cellulose, none the less in this applicant, as far as the record before us discloses, the first inventor of the successful photographic film pellicle. That being the case we deem it best to allow the claims, broad as they are, in the shape in which they are presented, in order that the applicant may, if he can, sustain them in the courts, since in that form the many difficult questions of use and fact raised by this record, and so difficult to determine in the consideration of parts, can best be settled and the interests of both the patentee and the public preserved.

All the judges concurred in this decision.

The concluding clause which I have above quoted relative to relegating the matter to the courts, etc., does not imply any uncertainty or weakness in the points specifically covered by the decision. On the other hand, the reasons given by the Board of Examiners-in-Chief indicate the attitude which I think the circuit courts will surely take relative to Gooch's patent, and these are
strongly in his favor. It may be relied upon in these days that where, as in this case, many skilled persons, fully acquainted with the prior art, have for years been striving for the attainment of a certain end but without success, that he who does succeed and produces a result which is accepted by the trade and extensively used, will be regarded as a meritorious inventor and his patent sustained, notwithstanding the fact that the things which he did, resulting in success, seem trivial and almost obvious in the light of his success. In other words, the courts may be relied upon to hold that it is the last step that counts.

EFFECT OF DECISION.

I call your attention particularly to the fact that the Board of Examiners-in-Chief based their decision and awarded the patent to Goodwin on two grounds.

First: that although the prior art showed a multitude of things all pointing to that which was accomplished by Goodwin, like the spokes of a wheel, yet that none of them actually reached the center where Goodwin stood.

Second: and an equally important consideration, that Goodwin had, as a matter of fact, produced and furnished to the trade a nitro-cellulose support which was the successful, commercially desirable, valuable thing this art had been so long attempting to attain.
Now, has it been demonstrated that Godwin did this? Eastman did, but did Godwin? He attached to the papers which he from time to time filed in the Patent Office three or four small samples of his support, and accompanied them by affidavits of certain photographers and others, who of course were allies of his, to the effect that they were satisfactory; and the Board of Examiners accepted these samples and these affidavits as establishing the fact. But a careful reading of the mass of papers I have been over discloses the fact that one at least of these samples was apologized for by Godwin or his attorneys, stating in substance that it was not a fair sample; and all of them, I am quite sure, if obtainable will be found to be very small pieces, probably not larger than a sheet of note paper, if as large. The papers intimate the loss of some of them, but there are, or should be, others on file now.

Moreover, the sample that your Mr. Frederick Anthony showed me some days ago as coming from the factory, did not impress me as being a commercially satisfactory product. I may be in error about this. At all events, the Eastman interest has attacked Godwin's invention, charging insistently that it is impossible to make a commercially satisfactory film by his process and ingredients.

In my judgment, therefore, it will be essential for you to produce by the practice of Godwin's exact process and by the use of his exact ingredients (or certainly their
chemical equivalents) a film of suitable area for commercial use in a roll-holder. What the cost may be is entirely immaterial; it may exceed that of the Eastman film a dozen times, but it must be a good film, better than that of Facke, Stevens, and the others, and equal photographically to that of the Eastman Company; because, if you cannot do this under the Goodwin process and ingredients, then his invention is no better than the forty-one other attempts that went before it. They were all failures and were turned down by the Board of Examiners-in-Chief for that reason, and if his is likewise a failure of course the court will likewise turn it down. Then Eastman (in other words, Reichenbach) will step into the proud position of having given this thing to the art, taking the place which the Board has awarded to Goodwin.

Moreover, this should be done with reasonable promptness, because it will not impress the court favorably if a long time elapses between the grant of this Goodwin patent and its practical use commercially, particularly since we are claiming so much for it. The Eastman Co. occupy a strong position in that they have actively, persistently and regardless of cost, pressed their manufacture through to a successful and enormous commercial utilization; and you must not occupy the position of holding a mere paper patent under which you strive to levy tribute.

The Goodwin patent was issued in 1898, Sept. 15th, about three years ago. Goodwin has a satisfactory excuse
up to the present time; his ill health, his insufficient means, his death, and the difficulty of moving an enter-
prise of this magnitude, will all satisfactorily account for the present condition. Moreover, the Goodwin Film &
Camera Co. has been organized and a factory has been built and the enterprise has been started, although, unfortunate-
ly, no goods sold commercially. Still, negotiations look-
ing to the establishment of the enterprise upon a firm
footing has been pending so long that up to the present
time no charge can properly be made; but now that the
matter is in your strong hands it would undoubtedly be pol-
icy to press it forward commercially.

I come now to a consideration of more important mat-
ters, those upon which, judging from my recent conferences
with Mr. Philipp, he will rely in defense.

He contends that the use by Eastman of camphor with
the nitro-cellulose removes their product entirely from
under Goodwin's claims, because, as Mr. Philipp says, Good-
win himself insistently urged this view during the pendency
of his case in the Patent Office, and that his application
was favorably regarded by the Board of Examiners-in-Chief
and was ultimately issued on the strength of these state-
ments, and that consequently his specification as claims
(the process as well as the product claims) must have im-
ported into them the substance of the said admissions.
This is an essentially important consideration in this matter, and in the interests of counsel who must pass upon it I will consider it somewhat in length, even reiterating some things already referred to for the sake of clearness, because it will be exceedingly difficult and expensive for counsel to cull and classify the facts from the mass of papers through which they are scattered, and through which I had to search for them.

In Goodwin's case as originally filed—indeed, in his patent as issued—he clearly contemplates that nitro-cellulose shall form substantially the sole basic material from which the supports are to be made. (Quotations following are from the specification.)

He says he produces a pellicle "the principal ingredient of which is nitro-cellulose." x x x

"In carrying out the invention I provide a suitable surface, such as that of glass, and flow over the same a "solution; preferably of nitro-cellulose dissolved in "nitro-benzene, or other solvents, such as may be employed in producing celluloid, as distinguished from "cellulose." "When this foil of nitro-cellulose has been thus formed"—and so on all the way through—"he refers to his basic material as nitro-cellulose; and he says he treats this nitro-cellulose first with a solvent, preferably nitro-benzene, and that he then thins the syrupy solution thus produced so that it may be properly flowed upon the glass plate, by the use of a diluent such as
alcohol. His first set of claims were exceedingly broad and need not be now considered.

Several rejections followed, in the course of which the case was more or less modified, and finally the interference with Eastman and Reichenbach was declared. At that time Godwin's claims were only two in number; one for the process, and one for the article, which read as follows:

1. The process herein described, which consists in applying liquid celluloid upon a plate or surface, giving the said celluloid supporting qualities by evaporating the liquid matter therefrom, and applying to the hardened celluloid film thus prepared a layer or covering of photographically sensitive liquid, and thus causing the filmage to act as a support, and drying the sensitive matter and finally removing the said sensitive matter, supported with or by the celluloid, from the plate, substantially as set forth.

2. As an article of manufacture, a sensitive pellicle, consisting of the evaporated or dried filmage of celluloid, having a superposed film of sensitive matter, the said filmage of celluloid serving as a support for the sensitive matter, substantially as and for the purposes set forth.

As I have heretofore stated, the interference went off in favor of Godwin as against Reichenbach, because of Reichenbach's disclaimer, and was disposed of, as far as Eastman was concerned, by the discovery of a new reference and Eastman's subsequent restriction of his claims.

Reichenbach limited his claims to his special composition, embodying camphor in some of them, and fusel oil and camphor in others, and his patent 417,262 issued.
Goodwin, then being unfortunately advised by Mr. Burns, the then Examiner at Washington, and contrary to the advice of his counsel, insisted upon rewriting his specification; and on Feb. 17, 1890, he bodily inserted in his application Reichenbach's five "camphor claims" word for word, including the fusil oil and camphor, and demanded an interference with Reichenbach.

The interference was declared on the issue of which were the Reichenbach camphor claims; and Goodwin in his Preliminary Statement therein, which was not filed until 1892, swore that he "conceived the invention set forth in the declaration of interference, or its equivalent (that is to say, the camphor and fusil oil matter) to the best of his present recollection in the month of December, 1890." This was his original date of invention.

Reichenbach's Preliminary Statement disclosed the fact that he did not conceive his invention until after Goodwin's case was filed. Consequently, in the absence of any action by Reichenbach's counsel, which should have been taken, this second interference was decided in Goodwin's favor on the record dates.

Thereupon Eastman's counsel, Mr. Philipp and Church & Church, moved for a vacation of the judgment, alleging among other things that Goodwin had no right to make the Reichenbach claims, nor to in any wise modify his application as originally filed, to include camphor and fusil...
oil; and that, in any event, if his invention did, as matter of fact, include the use of camphor, fusel oil, etc., that inasmuch as his application as originally filed contained no disclosure of that fact, whereas Reichenbach's did, that therefore Reichenbach was the first to disclose these matters of record, and was necessarily the senior applicant and Goodwin the junior; and consequently the decision on the record dates was erroneous and the interference should be reinstated, with the burden of proof thrown upon Goodwin.

This motion was strenuously argued by Church & Church and also by Phillips, Phelps & Hovey, for Reichenbach. It was appealed to the Commissioner, and the proceedings thereon became exceedingly voluminous. The outcome of this motion, and a series of others collateral to it, was generally in Goodwin's favor; that is to say, the interference was not dissolved, and Reichenbach was not awarded priority relative to camphor and fusel oil, but Goodwin was compelled to take the position of junior in the interference, which threw the burden of proof upon him, to prove that his original invention did include the use of camphor and fusel oil.

It seems to me that this decision was erroneous. The Examiner of Interferences had several times held that Goodwin did disclose this prior to Reichenbach, because in his amendment to the original case filed July 16, 1887, nearly two years before Reichenbach filed his application
in the first instance, Goodwin recited that as equivalents for the nitro-benzene many other "well known cellulosic solvents" could be used, mentioning a series, among them coumarine and fusel oil. Now, coumarine is, as Mr. Paget, one of Eastman's experts admitted, the camphor of tonca bean, and it, I understand, has substantially the same characteristics as ordinary camphor; and consequently the tribunals below had several times held that Goodwin had described the use of fusel oil and camphor prior to Reichenbach's filing date and was entitled to lay claim for these ingredients, and likewise to hold the position of senior in the interference.

The Commissioner, however, disagreed in a brief opinion which gives no reasons.

Thereupon Mr. Goodwin in a certain affidavit swears that being oppressed by the ruling of the Commissioner, which threw the burden of proof upon him, he decided to forego the claims for Reichenbach's special ingredients and to rely upon his broader and more generic ones. Therefore he, as I have previously stated, recast his application again, falling back upon his original premises, describing and claiming the invention broadly, substantially as he did before these many years of the Reichenbach camphor and fusel oil contest.

If the matter had rested here it would have been of but little consequence, because Mr. Goodwin could always
have said that owing to the great expense of an interference proceeding, whether he was junior or senior in it, with the rich Eastman Company, he preferred to forego Reichenbach’s details and fall back upon his own rock-bed claim; and that it was of little consequence to him whether or not Reichenbach had a patent for his special ingredients, since the broader Goodwin claims would dominate.

But, unfortunately, on Nov. 8th, 1896, three or four years after this, when Goodwin was still persistently urging his case before the Examiner, and when relations between them had assumed an attitude of almost personal antagonism, Goodwin filed a petition to the Commissioner in person, praying relief against an action of the Examiner; and he supported this petition with a most voluminous affidavit, in which among other things he referred to this camphor matter, and made statements which directly contradict his previously sworn-to Preliminary Statement in the Reichenbach camphor &c. interference. He then said he had “conceived the invention set forth in the declaration
" of interference, or its equivalent (that is to say, the
" camphor and fusel oil matter) to the best of his present
" recollection in the month of December 1896.” Yet in this later affidavit of 1896 he swears in effect that he never used camphor, that nitro-cellulose alone was his basic material, that camphor was not a solvent unless it was combined with fusel oil, and that he did not and never
had contemplated using a material which was the equivalent of celluloid (in other words, camphorated nitro-cellulose) and that therefore there could be no conflict between Reichenbach's patent and his application.

This is most unfortunate, because if Reichenbach does not conflict with Goodwin, it can only be because their things are different, and if so, how can Goodwin control Reichenbach as an infringer?

Goodwin made these statements in his 1896 affidavit because at that time the Examiner was persistently citing Reichenbach's patent 417,202 in rejection of the claims which Goodwin was then urging. Such reference was altogether illegal, because Goodwin could claim nothing excepting that which was properly includable within his original invention, and if he was attempting to do otherwise the Examiner should have rejected the claims as "new matter" having no foundation in the original invention. But in no event could the Reichenbach patent be cited as a reference, because it was subsequent to Goodwin and he could not be rejected upon anything coming after him. On this point afterwards an appeal was taken to the Commissioner and the Reichenbach patent was ordered removed as a reference.

The contents of Goodwin's affidavit of Nov. 8th, 1896, on this point are so important that for your convenience and that of counsel I will refer to them more at length.

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He says (p.3 of his affidavit):

"After learning of the issue of this patent to Reichenbach, almost immediately I hastened to the Patent Office wondering what it could mean, and I was informed by the Office that the issue of the patent was an inadvertence. I accepted this explanation, as I believed and do now believe that the Examiner was an honorable and conscientious officer.

It was indeed an inadvertence, which if harmless to one applicant entailed upon the other applicant much damage, for in then asking of the Office advice what I should do, I was counselled to incorporate the five claims of the Reichenbach patent and insert them bodily into my application and then ask to be put into interference. I replied, 'How can I, for camphor is an integral part of each of those five claims of Reichenbach, and camphor is not even alluded to in my specification.'

"After a brief examination of my specification, containing the words 'celluloidal nitro-cellulose' the Examiner said, 'It is all right, celluloid must have camphor; insert camphor.'

"I returned to my attorney who immediately rewrote the specification, which then, for the first time and nearly three years after the application was filed, was made to incorporate camphor; camphor was then declared a solvent of nitro-cellulose.

"But my attorney objected to taking the five claims and inserting them word for word as affording subject matter for an interference issue. Afterward, however, upon my somewhat earnestly insisting upon following the advice of the Office, he reluctantly yielded and inserted the five Reichenbach claims, each containing camphor as an integral element.

"That insertion of camphor did me very serious damage, the nature of which I had not the slightest thought of when I accepted the advice of the Office, damage not only as having given occasion for protracted litigation with a wealthy contestent, but resulting finally in the decision of the Honorable Commissioner to the effect that Goodwin in all following proceedings must show that he had a right to insert camphor and those five claims of Reichenbach, that the burden of proof would rest upon him.

"But not only such injury did the insertion of camphor cause, but another and very serious one by making the article I claim to be classified as camphorated celluloid, a tautological term perhaps, but expressing my meaning. Commercial celluloid always contains camphor.

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"I now return to the repeated statement that the substance of the article described by me is not composed in part of camphor and in part of nitro-cellulose; it contains not an atom of camphor as described. The sample sent to the Office at the time of filing, the sample now presented [Crockett Exhibit], as well as those put upon record in this Office during the interference with Reichenbach were without any camphor.

"In my original specification it is expressly stated that in order to make this article, nitro-cellulose was dissolved in nitro-benzene or other solvents, and flowed, &c.; also it is expressly stated that the principal ingredient is nitro-cellulose. Not the slightest reference anywhere is made to camphor; in fact because nitro-cellulose cannot be dissolved, as it well known to experts, camphor is excluded by the very reading of the specification when it declares that the article is made from "dissolving nitro-cellulose in nitro-benzene or other solvent" and camphor itself is not a solvent under any ordinary condition."

He then proceeds and states that wherever he has used the words "celluloidal compound" &c., he has not meant camphorated nitro-cellulose, which is true celluloid, but that he used the term broadly to imply a material having the general characteristics of celluloid in contradistinction to collodion.

On page 7 he says:

"It is also further true that even in an early amendment of the original specification I described my article as 'celluloidal' and called it 'celluloidal nitro-cellulose,' but I meant not thereby that it was composed of camphor as is celluloid; I meant that in many respects it had the appearance of celluloid, resembled celluloid more than it did collodion, having more textile strength, non-porosity, self-supporting capacity, than has collodion."
Further down in his affidavit (page 21) when considering the mass of alleged anticipating references, he takes up the subject of celluloid, and in striving to differentiate his invention from the celluloid references he says:

"Celluloid is always a compound substance, whether in its incipient stage of formation or as a dry and cured product. To be celluloid it must be composed of camphor as well as nitro-cellulose. The percentage of camphor never being less than 40%, often greater."

**NOTE:**
(Eastman's proportion of camphor was about 40%)

"But what significance has the presence of camphor in determining the fitness of the pellicle for photographic purposes? It has a material significance. The presence of camphor entails upon celluloid used as a support, a photographic influence it would not have if composed of nitro-cellulose devoid of such camphor."

Here follows a long discussion of the chemical actions and reactions which Goodwin suggests may occur when camphor is brought into contact with the chemical elements used in photography. He considers it most exhaustively and very effectually condemns camphor as an element in supports for a photographically sensitized material which has subsequently to be exposed to the developing, toning and fixing solutions; and he concludes this discussion of camphor with the statement that in 1899 the Eastman people put the Reichenbach film upon the market; he speaks of it as a beautiful film, that photographic writers were eulogistic and the trade enthusiastic over it; but shortly the defects in the film appeared (due as he says to camphor) then the goods were shipped from
all over the world back to Rochester and the photographic
journals began publishing condemnatory articles. And he
attaches to the original of his affidavit two samples of
the Rochester support— one labelled No. 7 which was made
in 1889, and the other No. 8 which was manufactured in
1896, the year of his affidavit; and he says— "By scratch-
ing or folding such the evidence of camphor is clear in
the support of the earlier date, and the absence of camphor
is evident in that of the latest date."

In another place he says that the camphorated one
shows crystallization upon scratching or creasing, the
later one does not.

And he further refers to the Blair film, which was
offered upon the market in 1890 or 1891, which he says
was made without camphor, and he offers a sample of it,
"No. 9". He says:-

"Its basis is simply nitro-cellulose. Scratch
or fold it and no trace of camphor can be detected either
by the eye or smell; it is like the Reichenbach in appear-
ance but in substance it is like that manufactured by me
which contains not an atom of camphor. This Blair film was
from the very start a success. Never, so far as I am
aware, was a word ever heard or published against it."

I do not understand why Mr. Goodwin made these state-
ments and violent attack upon camphor in 1896, since in
1887 by his amendment to the original case he had express-
ly stated that he did employ fusel oil and camphorine,
which is the camphor of tonca bean; and also in a letter
to Mr. Goldsboro (of Fenn & Goldsboro who at one time represented him in Washington) dated March 18, 1892, in asking him as to the various solvents &c. which he had used, he writes over his own signature:

"As to my very early use of camphor I presume my own testimony would not be accepted. I have of late been endeavoring to refresh my memory and if my testimony were allowed I would sooner testify that I did use camphor than that I did not, prior to the date of my original application. I distinctly remember buying it for the purpose of using it and I know that I used many things in the same line, the exact name or nature of which I do not remember with distinctness. However I cannot at present unqualifiedly testify to the actual use of camphor, I can testify that it, as a solvent of nitro-cellulose was in my mind before the date of my application, and that I also had it in mind in connection with my amendment of July 16, 1887 (this amendment was filed July 18th) when I said- the acetate of amyl or fusel oil or many other solvents that have been employed and described &c. In fact my mention of fusel oil among the solvents of nitro cellulose would imply that I must have contemplated camphor as a solvent, for fusel oil is a solvent only when in combination with camphor."
A year and a half after this Mr. Goodwin came to the conclusion that he could accomplish nothing with the Examiner and he consequently took an appeal to the Board of Examiners-in-Chief. Before them, as previously stated, the case was argued with the utmost vigor by Goodwin's attorneys and the Examiner presented an exhaustive statement on his (undoubtedly Eastman's) part. This resulted in the decision of the Board which I have already referred to.

Before the Board the same arguments as are set forth above relative to camphor were urged on Goodwin's behalf, but they were materially modified and softened in the following manner.

Goodwin's counsel in the opening of their argument recited the salient features of the application during its ten years of struggle through the Office, and in so doing they referred to the Reichenbach patent and the interference between Goodwin and Reichenbach, and openly and emphatically contended that Goodwin's and Reichenbach's inventions were broadly the same, and that Reichenbach's claims recited merely one specific composition by which, or under which, the broader Goodwin invention could be practiced: in other words, that Goodwin as matter of right was entitled to claim the invention broadly, thus dominating Reichenbach, although in view of his withdrawal at the time of the interference he had conceded to Reichenbach his special ingredients. And in support of their conten-
tion as to the equivalency of the two when broadly consid-
ered, they referred to the fact that the Office had always
held this to be the fact because of the insistent citation
of Reichenbach as a reference. This is a very forceful
consideration; and at the conclusion of this the argument
closes with this suggestion:—

"In applicant's (Goodwin's) film the solvent and
"diluent evaporates, leaving the deposit principally, if
"not wholly, of nitro-cellulose divested of fiber, or,
"as originally expressed, 'the principal ingredient of
"which is nitro-cellulose.' Small portions of other
"matters, even camphor, may perhaps be introduced without
"materially injuring the pellicle, these serving as im-
"purities and to the extent introduced, they are object-
"ionable. But, it must be observed, the nearer pure
"the described starting materials are, the better the
"pellicle."

This statement, coupled with the positive state-
ments relative to the injurious effect of camphor, and the
fact that Goodwin never employed camphor (which have been
above referred to as embodied in his 1896 affidavit, and
which were likewise included in this argument before the
Board, upon which the patent issued), leaves the matter in
a somewhat contradictory and uncertain condition. But,
as in all such cases, the court will consider the papers

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as a whole and will arrive at their conclusion as to Mr. Goodwin's intentions, and as to the effect of his statements upon the three judges constituting the Board when they approved the patent, by a consideration of the whole record taken together; and when all things are considered (not one-tenth of which have I set forth here) they will I am positive, arrive at the conclusion that Goodwin intended to say, and the Board understood him to say, in substance, that his invention broadly considered contemplated the use of pure nitro-cellulose without camphor as the basic material; that that was Goodwin's preferred composition, and that in his opinion it made the best film or support; but that Goodwin did not intend to say, and the judges composing the Board did not understand him to say, that his invention excluded every atom of camphor, so that one employing an unimportant percentage thereof would avoid the charge of infringement. On the contrary, the Board, who had all of the papers before them with their attention called specifically to them and to every phase of the case, approved Goodwin's claims and ordered the patent to issue on the understanding that Goodwin was the first to invent and was entitled to protection for such a film or support made by the process and by the use of the ingredients he describes, and that the basic material of the support was to be nitro-cellulose, but that the addition of an immaterial proportion of camphor or any other body (provided its amount was not sufficient to sub-
stantially modify the character of the product—(that is to say, to such an extent that its characteristics would be materially changed) was unimportant.

INFRINGEMENT BY EASTMAN CO.

It only remains to consider the question of infringement by the Eastman Company.

Although Mr. Goodwin was the first to produce a support having the peculiar characteristics and features necessary in a commercially successful one, particularly its adaptability to use in roll-holders, nevertheless that fact does not determine the scope of his monopoly. His patent and its claims alone determines that question. It is therefore necessary to examine them, and in so doing I shall pass by many interesting considerations, stating briefly the important ones only.

The gist of his invention consists in dissolving nitro-cellulose in nitro-benzole or equivalent non-hydrous and non-hygroscopic solvent, other than those which are employed in the manufacture of collodion; and then diluting the resulting solution with a suitable extender, such as alcohol or other hydrous and hygroscopic diluent. The equivalents of nitro-benzole as a dissolving element are those non-hydrous, non-hygroscopic fluid solvents of nitro-cellulose which are non-miscible with water, of slow volatility and non-greasy; and the equivalent of alcohol
as the diluent or extender is any element which serves to dilute or thin the dissolved nitro-cellulose and increase its fluidity, and which may be and ordinarily is hydrate, hygroscopic, miscible with water and highly volatile. The fluid thus extended or thinned is flowed upon a smooth and hard surface, such as glass, and after drying the sensitized material is applied to its surface.

The specification ascribed special value to the process involving the employment of a non-hydrate and non-hygroscopic solvent in conjunction with a hydrous and hygroscopic diluent, as follows: It reads (line 19, p.2):

"Now this water contained in the alcohol, aceton, acetate, and the like, does after the evaporation of the pure alcohol, acetate, or acetone element, act powerfully as a precipitant of dissolved nitro-cellulose, and consequently acts as an accelerant in the setting, drying and hardening of the resulting film. These hydrous and hygroscopic alcohols, acetates, etc. have a lower boiling point than water and therefore in evaporating from a solution of nitro-cellulose they leave water, which they contain, behind them in the solution, whereas those other non-hydrate and non-hygroscopic elements above described (the solvent) are of a boiling point higher than that of the water which may have been introduced into the dissolved nitro-cellulose, and therefore after the said water, having exercised its accelerating effect upon the precipitation of the nitro-cellulose, has itself evaporated from the solution those said non-hydrate and non-hygroscopic elements remain still in a fluid state, with the function of allowing the atoms of nitro-cellulose to be held in such a position of equilibrium, contiguity, and contact as finally to combine together in the formation of the desired film. Water, therefore, with a boiling point of 120° F, is a divisional criterion by which one class of slowly volatile cellulosidal solvents (which I may term for the purposes of this case 'eventual' or 'final' solvents, because of their remaining in the solution after the evaporation of the water in the solution, which final solvents are repre-
sented by nitro-benzoë, with a high boiling point of about 415° F. and therefore with a relatively slow evaporating quality) may be distinguished from another class of cellulosal solvents or diluents having a low boiling point and a relatively quick evaporating quality—such, for example, as wood alcohol, with a boiling point of 149° and methyl acetate of 132°, so.

The latter solvents I have discovered, while being cellulosal solvents of nitro-cellulose will not act efficiently as final or essential solvents but are valuable as diluents. They are hygroscopic and miscible with water. They evaporate quickly, leaving the water as a precipitant. x x x

(line 78, p.2)

"The eventual cellulosal solvents, such as nitro-benzoë, acetyl acetate, boiling point 264°, remaining after the evaporation of the hygroscopic and hydrous elements, being non-hygroscopic and non-hydrous and non-miscible with water and yet fluent, allow the film after the evaporation of the water and hygroscopic matter to remain more or less fluent so that it is given a full and sufficient opportunity to settle and harden into a compact, clear, and smooth pellicle having the peculiar glass-like but flexible characteristics before recited. Having evaporated the more quickly volatile and hygroscopic fluid matter and the nitro-cellulose having had a full opportunity to settle and close the pores from which the more volatile diluent escaped, and then having evaporated the less volatile, non-hygroscopic fluid instead of a porous, spongy, and weak residual film, a compact, hard, tough, self-supporting, non-porous and structureless sheet remains, which is flexible to a degree suited tooller camera purposes."

The claims of the patent are for the article and also the process by which it is made. The strongest article claim is the 10th, which reads as follows:

"10. As a new article of manufacture, a transparent film support for photographic purposes, the same consisting of a thin, non-granny, film, foil or pellicle of a dried and hardened cellulosal solution of nitro-cellulose, combining in addition to the following essential properties of glass-plate supports, viz., insusceptibility in developing fluids, insusceptibility to heat and moisture, imperviousness of structure, and hardness, smoothness, and brilliancy of surface, the further desirable properties of exceeding thin-

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ness, lightness in weight, toughness in texture and 
elasticity in flexure; as and for the purposes speci-
fied."

The claim seems somewhat involved, but a careful 
reading of it and reference to the specification makes 
its meaning unmistakable.

You will note there is no mention of camphor made 
in it, nor is there any reference to camphor in the spec-
ification, excepting that the word "coumarine" is there.

It is now well settled that the history of an ap-
lication during its pendency in the Patent Office, and 
the statements made by the applicant therein, may be re-
f erred to in determining the scope of the claims; and the 
court will do this if attention is called to it.

Now, although the Examiner at Washington held as 
matter of law that Goodwin's invention included camphor 
and that he was entitled to amend his case and write it 
in, and even advised him to copy Reichenbach's camphor 
claims word for word in his specification; and although 
Goodwin did this and subsequently swore in his preliminary 
statement on the resulting interference, that his invention 
did include camphor; and notwithstanding the fact also 
that two years before Reichenbach filed his case in the 
first instance Goodwin had, in an amendment, included in his 
application, as of his original invention, fusel oil and 
coumarine; never-the-less, inasmuch as afterwards in 1896, 
when Goodwin was confronted with certain celluloid refer-
encees and the Reichenbach patent (erroneously cited against him, it is true, but that does not help him), he then made a sworn statement in which he insisted in substance, for the purpose of avoiding these references and that he might secure his patent, that it was impossible to produce a usable film if camphor were present, and gave fifteen or more reasons why camphor would preclude successful manufacture of the article in question; and since he urged the same points in the contest before the Board of Examiners-in-Chief (during which, however, he modified his statements by saying that there should not be any considerable amount of camphor present); and since it was upon this presentation by him of his own case that the patent issued: I am of the opinion that the Eastman Company cannot be held under the 10th claim, or either of the other two article claims, of the Goodwin patent, provided the fact be that their film does contain such a proportion of unaltered camphor as to be within Goodwin's disclaimer.

The question of the infringement of Goodwin's article claims, therefore, seems to depend entirely upon whether or not the Eastman film includes the precluded or disclaimer amount of camphor. On this point the following is pertinent.

During the course of the proceedings Goodwin, in his 1896 affidavit, swore that the Rochester films when they first appeared in 1889 were hailed with acclamations by the entire photographic world; that in 1890 serious de-
fects developed in them, and thereupon the Eastman Co. changed their manufacture and eliminated the camphor. And in proof of this he attached to his affidavit the samples of the Eastman film before alluded to; and he also attached to the same affidavit a piece of Blair's film, which he says was always successful and that it never contained camphor.

This I think is not conclusive, because it will be noted that the Eastman 1889 sample was six or seven years old at the time Goodwin made his affidavit and creased and scratched and found it crystalline. It may well be that in that time a chemical change, entirely separate from any camphor question, had come over the exhibit.

Again, in an affidavit made by Mr. Eastman Feb. 13th, 1890, he swears that the film made by his Company contains about 40% of camphor; but you will note that this affidavit was made February 13th, just at the commencement of that year, and it was not until later, according to Mr. Goodwin's affidavit, that the goods began to come back to the Eastman Company and they changed by eliminating the camphor.

Also, later than this, in 1891 and 1892, in certain notes made by Mr. Philipp for use by him on the argument of a motion for preliminary injunction in one of the celluloid cases (copy of which notes I have) Mr. Philipp gives among Eastman's ingredients about 40% of camphor, and speaks of the addition of a certain percentage of so-called
"secret material". There is a statement in another place to the effect that the secret material is added for the sake of giving a smooth, glass-like surface to the support; but it may give this result because of its nutrient action on the camphor; in other words, the camphor may be put in by Eastman as a protection against the Goodewin patent, and then to neutralize the deleterious effects of the camphor he may have added this secret material.

From the above it appears that for some years, presumably as late as Mr. Philipp's notes, which were in 1897-2 the Eastman Company was using about 40% camphor; and whether they neutralized the camphor by the addition of the "secret material" or not, we do not know. But this is unimportant in my judgment, because all this was prior to the issuance of Goodewin's patent and he can make no recovery for that period. In order to ascertain what the Eastman Company are doing now, and in accordance with your conference with Mr. Eastman, I went to Mr. Philipp and asked him openly, in the interest of both parties, for a specific and detailed statement of the ingredients, process, method, &c. of the Company. He demurred at first, but finally, on my suggestions concerning policy, &c., said he would look into the matter and communicate later.

I know that he has had two, and perhaps more, conferences with Mr. Eastman since then; and he informed me Sept. 9th that he could tell the following but preferred to go no further; that is to say, the Eastman composition is now
Fusel Oil,
Wood Alcohol,
Acetone,
Camphor,
Pyroxyline (nitro-cellulose).

He would not tell me the proportions, the order in which they were used, or the method. I asked about the so-called secret material; he said he knew of none such, although it is referred to in his own notes in the Celluloid case above alluded to. I asked him to give me the proportion of camphor, stating that was one of the important things I wished to know, and if he would not give me that his disclosure was of but little value to me. He said he would not give me the proportion of camphor incorporated during the process of manufacture, but would state that during the drying operation the films were subjected to 175° of heat, so that the minimum proportion of camphor to the nitro-cellulose (pyroxyline) was 52 parts nitro-cellulose to 3 to 5 parts of camphor.

From this you will note that the camphor in the finished commercial film now made by the Eastman Company is 12% only as compared with the 40% which they used during the early years; thus sustaining Goodwin's statement. And, furthermore, that the camphor which is incorporated during the manufacture is intentionally driven off by the employment of heat during the drying process; thus distinctly showing that that accords the fact that the nearer to pure nitro-cellulose the better the product, and they leave the small percentage of camphor obviously with
the intent to avoid the Goodwin patent.

I am also of the impression, although my knowledge of chemistry is not sufficient to enable me to state the fact positively, that subjecting camphorated bodies to any considerable degree of heat so modifies the camphor by driving off its volatile elements (which are the specially potent ones chemically) that such remainder of camphor as may be left after the heating will be largely an inert body. Consequently the 12% of camphor that still remains is probably in effect a neutral body, resembling any other foreign substance, such, for instance, as whiting.

Also, I call your attention to the fact that the camphor is not 12% of the total body of Eastman's commercial film; it is 12% of the nitro-cellulose only. In addition to the camphor and nitro-cellulose there are in the film, if & am correct chemically, certain percentages of the other ingredients employed—to wit, fusel oil, wood alcohol and aceton. These percentages, however, are small, but they will tend, so far as they go, to reduce the proportion of camphor.

Although I do not doubt Mr. Philipp's statement, still it would undoubtedly be satisfactory— in fact, essential— that you procure two or three samples of the Eastman film of different ages; say a fresh one, one three months old, one six months old (up to which time I understand they guarantee their effectiveness) that they may be analyzed to find out about this matter. Also, you should
procure evidence of the shop practices in the Eastman works, if possible. I am quite sure that if we knew all things a chemist would discover almost exact utilization of the Goodwin invention, even in its details.

Considering now the elements of Goodwin's 10th claim:

The Eastman product is a transparent film support for photographic purposes. It does consist of a thin, non-greasy pallicle of a dried and hardened solution of nitro-cellulose. It does combine, in addition to the properties of a glass plate, the further desirable property of exceeding thinness, lightness in weight, toughness in texture, and elasticity in flexure.

If, therefore, we can show that the percentage of camphor left in Eastman's finished film as he presents it upon the market is so small that the product is in all essential respects the same as though it were nitro-cellulose alone, so as to fall fairly within the presentation of his invention made by Goodwin and his attorneys during its pendency in the Patent Office—especially in view of the fact that Goodwin's article claims impose no limitation in this respect—then I am clearly of the opinion that the Eastman Company infringes the 10th claim of the Goodwin patent, and also one, if not both, of the other article claims. Moreover, it will, I think, transpire that the chemists will find the percentage of camphor left in the
Eastman commercial film unimportant, due to its altered character, either because of its having been subjected to heat or because of the employment of the mysterious "secret material". And I am confirmed in this belief by the fact that, whereas in 1889 Dr. Goodwin found certain chemical results following the use of camphor as Eastman then used it (which resulted in large quantities of their then product being returned to them), in recent years there has been no such complaint, the product is apparently perfectly satisfactory. This is conclusive proof either that the proportions are such as to make the films substantially the same as Blair's, which were made of pure nitro-cellulose, or else that the camphor has by heat or the "secret material" been so acted upon as to be in the finished product substantially a neutral body. I do not see any escape from one or the other of the conclusions, and they are both in your favor.

THE PROCESS CLAIMS.

We come now to a consideration of Goodwin's process claims.

In a patent for a process which is fundamental in any art, and by which for the first time that art obtained knowledge of a valuable method of system under which a complex body can be successfully manufactured, the process claims, if the inventor be the pioneer as I say, will be
construed by the courts generously, even to the limit of
the language employed in them; and all immaterial or un-
substantial variances in the matter of special ingredients
&c. will be disregarded, provided the essentials of the
method, system or process first promulgated by the invent-
or be employed.

Take, for example, Goodwin's first claim, which
reads as follows:

"1. An improvement in the art of making trans-
parent, flexible, photographic-film pellicles, the
same consisting in dissolving nitro-cellulose in a
mixture containing a hygroscopic element and an
element which is non-hygroscopic, the non-hygroscopic
element being of itself a solvent of nitro-cellulose,
and of slower volatility than the hygroscopic element,
depositing and spreading such solution upon a support-
ing surface and allowing it to set and dry and harden
by evaporation, and spreading a photographically sen-
sitive solution on the hardened film, and drying the
film, substantially as set forth."

Eastman's fusel oil is the non-hygroscopic element,
it is slowly volatile, and is, in the presence of camphor,
a solvent of nitro-cellulose.

Eastman's wood alcohol and acetone are the hygro-
sopic elements or diluents, and they have quicker vola-
tility than the non-hygroscopic element--i.e., the fusel
oil.

Eastman does flow the resulting liquid upon a sur-
face and allow it to dry and set and harden by evaporation.

Eastman does then spread a photographically sensi-
tive solution on the hardened film and allow the same to
dry.
Possibly Eastman employs the camphor solely to render the fusel oil a solvent.

I am clearly of the opinion that in practicing the above process Eastman avails himself of that which was first disclosed in the Goodwin patent, and that it makes no difference, so far as these process claims are concerned, whether he incorporates with the nitro-cellulose a proportion of camphor, or not, for they stand on a broader basis than the article claims; or whether he uses the alcohol and acetone as a primary solvent, afterwards adding the fusel oil as a diluent, or the reverse. Goodwin prefers to employ his nitro-benzole as the primary solvent, and then to use the alcohol as a diluent or extender; but obviously the special order in which these elements or chemicals are mixed can make no difference. The essence of Goodwin's invention is to procure nitro-cellulose in a suitably fluid condition to properly spread over a glass plate, and that the material which have secured such solution shall be of a non-hydrous, slowly volatile character and a hydrous, rapidly volatile character, so that when the liquid has been spread upon the surface there will be an immediate escape of the highly volatile elements from the hydrous substance, leaving its water behind for the purposes of precipitation, as heretofore explained; and that after that water has passed off there shall still remain the slowly volatile material as a lubricator, so to speak, of the particles composing the film whereby they
may adjust themselves and settle with the requisite compactness, solidity and firmness in the gradually drying and hardening sheet or film.

I call your attention particularly to the fact that this and other similar process claims have been conceded to Goodwin from the start; that although Reichenbach and Eastman in the early time presented claims substantially like them, yet Reichenbach by distinct retraction and limitation to the fusel oil and camphor conceded this broader invention to Goodwin; and that Eastman, after the suspension of the interference in which he was involved, rescind his claims, restricting them, and did not again present any of a scope adequate to conflict with Goodwin; but he (Goodwin) on the other hand, continued through all this altercation in the Patent Office to persistently urge his right to these process claims broadly, and although the claims now in the patent as issued are more descriptive, more definite and exact than those presented by him in the earlier time, nevertheless they mean substantially the same thing that those earlier ones did.

That which I have said above relative to claim 1 applied equally to a number of the other process claims. This opinion is necessarily so extended that I will make no further specific allusion.
CONCLUSION.

1st. I know of no patents under which you can be charged with infringement, provided you embark in the business of making and selling photographic films, and provided also you follow the process and ingredients of the Goodwin patent.

2nd. Before expending any considerable sum for installation of a plant you should by all means experiment somewhat relative to the difficulty of separating the film from the glass plate; the question of the adhesion of the sensitive emulsion, etc.

3rd. You should without delay take steps to get your product upon the market; bring it into the art commercially as well as by your patent. And since this cannot be done if you wait to install your plant complete, I suggest the desirability of contracting with some concern now engaged in the business of making similar goods, to temporarily manufacture for you under your direction and directly within the Goodwin patent.

4th. Samples of the Eastman film should be procured and analyzed for the purpose of ascertaining the ingredients used, and also such steps as possible should be taken to ascertain the details of shop practices followed in the Eastman factory.

5th. If the chemists shall find that the amount of camphor present in the Eastman finished film as present-
ed to the market, does not substantially differentiate it from the all nitro-cellulose film of Goodwin, then I am of opinion that the Eastman film is an infringement upon Goodwin's article claims.

6th. If Eastman does use a proportion of camphor which would normally fall within Goodwin's disclaimer, but if by the use of the so-called "secret material" or otherwise he neutralizes the effect of the camphor, then his film likewise infringes Goodwin's article claims.

7th. If Eastman's process is such as I have reason to believe it is, judging from his sworn statements, the Eastman and Reichenbach patents and Mr. Philipp's recent statement to me, then I think the Eastman Co. infringes the Goodwin process claims, or some of them at least.

The foregoing are my conclusions in the premises, but this case embodies a number of very involved and complex questions never judicially determined, so far as I am aware, and although I dislike to suggest the employment of counsel prior to your determination to bring suit against the Eastman Co., yet in this case I request that you authorize me to confer with counsel. I will present only so much of the voluminous mass of papers as may be necessary for a determination of those points upon which a conference is necessary.

Respectfully submitted,

(Sgd.) Phillips Abbott.

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Eastman Kodak Company: Patents
An outer casing or jacket surroundening the trough, for the purpose of containing hot water in cases where the coating liquid employed may require the application of heat in order to retain it in a plastic state as for instance gelatine-chloride emulsion or other solution containing gelatine.

The liquid coating to be applied is placed in the said trough and if it be a gelatineous solution the outer jacket is also filled with water of a sufficiently high temperature to prevent the solution in the trough solidifying. The roller having been placed in position, and partially immersed in the solution in the trough is set in motion by hand or by any convenient mechanical means the object being to secure a steady regular motion. As the roller revolves a portion of the solution in the trough is carried round with it adhering to the surface. The glass plate or other surface to be coated is now taken up by means of a suitable holder applied to its back and passed across the roller in a direction opposite to that in which the latter revolves. The consequence of this is that as the plate of glass (or other material) comes in contact with the roller, the liquid adhering to the surface of the roller is arrested and forms a wave on the surface of the glass and as the glass is drawn with a regular motion across the roller a uniform layer of
the solution is left thereon. As soon as the glass or other plate has passed the roller (the coated side being now underneath) it is turned over by the operator and laid with its coated side uppermost upon a level table to set dry.

In this manner gelatin-coated dry plates, calotype plates, or other articles which are required in large numbers may be prepared with the greatest rapidity and of a better quality than is possible by hand work.

By causing the glass or other plate or object to be cooled to pass across the roller in a direction contrary to the revolution of the latter the coating is applied to the plate after the latter has passed the roller. This renders the coating more uniform and is not influenced by varying pressure of the plate upon the roller. Moreover it enables the operator, by altering the speed of the roller or of the passage of the plate across it to vary and control the thickness of the layer of gelatin or other matter left on the plate.

I construct the trough of silver (or other metal electroplated with silver), tin-plate, glass, or other suitable material which shall have no chemical action upon the solutions contained therein and is to be of such size and shape as may best suit the purpose to which the apparatus is to be applied, but preferably of a semi-
cylindrical form and provided with a flange or rim to enable it to be fitted into the apron-like outer jacket. The said roller is constructed of india rubber, glass, hard wood or other material capable of being turned to a true surface but I prefer india rubber. It is fitted with a stock or spindle of steel, iron or other suitable metal which may be silver plated on that portion of its length which projects outside of the body of the roller. Or such a stock or spindle may be passed through an accurately turned wooden roller which in turn is carried with an outside casing or tube of soft india-rubber prepared for that purpose. The roller is mounted between centres so that it will revolve within the hough, the stock or spindle passing through apertures or also provided in the ends of the hough and of the outer jacket for that purpose. When in position the body of the roller occupies the whole length of the hough and must be of a diameter suitable to the dimensions of the hough; but it is important that the respective dimensions be so arranged that the roller may be immersed to the depth of one third of its diameter in the liquid contained in the hough.

The outer casing or jacket should be of such form and dimensions as will be most suitable and it may be constructed of zinc, iron, copper or other material. It may
be supported on feet by means of which it can be screwed or otherwise fastened to a table or bench; and if necessary arrangements may be made by means of which the heat of a spirit-lamp or Bunsen's-burner may be applied so as in order to keep up a uniform temperature, while the apparatus is at work.

I do not confine myself to the precise details of construction above described as the said apparatus may be made in somewhat different form without departing from the principle of the said invention.
GEORGE EASTMAN

IN THE UNITED STATES PATENT OFFICE

BEFORE THE EXAMINER OF INTERFERENCE

GEORGE A. WATERS

GEORGE EASTMAN.

Interference, Photographic Shutters,
No. 13,633.

Testimony on behalf of George Eastman, taken at the office
of George H. Carrihan, 207 Ellwanger & Barry Building,
Rochester, N. Y., Monday, May 9th, 1893, at one o'clock p. m.,
pursuant to the annexed notice and by consent.

Present:

Fred F. Church for George Eastman,
George H. Selden for George A. Waters, and George A.
Waters.

GEORGE EASTMAN,

being produced and first duly sworn, deposes and says, in answer to interrogatories propounded to
him by Fred F. Church, as follows:

Question 1. What is your name, age, residence and occupation?

Answer George Eastman. I am 38 years old. Live in
Rochester, N. Y., and am Treasurer and Manager of the Eastman Co., Manufacturers of Photographic goods.

Q: 2. You are one of the parties to the above entitled inter-
ference, and the patentee of the invention contained in the
Patent No. 98,850, granted September 4th, 1889, are you not?

A: Yes sir.

Q: 3. Please state when you first conceived the invention, particularly regarding the photographic shutter revolving around a lens and having coincident apertures, contained in the letters patent above referred to, when you made any drawings illustrating it, when you explained the invention to others, and
George Eastman

What steps were taken toward experimenting and perfecting the shutter and cameras to which it was adapted?

A. I first conceived the invention about the 10th of October, 1887. I started work on the wood work of the camera on the 12th of October. On the 14th I made a drawing of the shutter and explained it to William J. Krieg and others at Yawman & Erbe's machine shop. Mr. Krieg commenced work immediately on a shutter, made according to my drawings. I have here the first three shutters which he made. Two of them were finished prior to the 6th of November, 1887. On that day I made pictures with one of them, which had been put into a camera. The shutters referred to are marked No. 1, 2 and 3. The negatives are marked "Kodak Nov. 6, 1887." On November 20, I made other negatives with the same camera. These negatives I produce and are marked "Kodak Nov. 20, 1887." As soon as the model No. 3 had been finished, we started several other shutters which were put into cameras and finished about the 1st of January, 1888. I took one of these cameras with me to New York and Washington about the middle of January. I produce here a picture made with this camera, the negative from which it is printed was made in New York, Thursday, January 19th, 1888. About this time the tools for making cameras in large quantities were commenced and preparations were made to get out a large quantity of the cameras. Six more cameras were made principally by hand and they were finished, or part of them, on the 10th day of February, 1888. They were in our factory when it was partially destroyed by fire on that date and were damaged. I produce one of them here and another of the same lot which may have been elsewhere. They are marked "Exhibit No. 4 and No. 5." I also produce the camera that I took to New York and Washington, or its mate, made at the same time, marked "Exhibit No. 6." The cameras were put on the market in large quantities in the summer of 1888, and since then we have sold several thousand containing the invention in interference. Mr. Krieg was continuously at work on the shutters from October 14 until he had
TESTIMONY ON BEHALF OF THE DEFENDANTS.

Rochester, New York, November 9, 1914.

George Eastman.

George Eastman, on behalf of defendants, testified:
I am one of the defendants in this case; am 60 years of age, and have resided in Rochester since 1860. I was born in Waterville, Oneida County, New York.

I first became interested in photography in 1878, at which time I was bookkeeper in the Rochester Savings Bank. The process then in vogue was known as the wet collodion process, and I was interested in it as an amateur first.

In the wet collodion process, as I knew it in 1878, the photographer took a glass plate, coated it first with a very thin solution of albumen, to make the subsequent coating stick; then coated it with a solution of gum cotton, alcohol and ether, which contained certain salts, bromide and iodide of potassium or ammonium; that coating was partially dried or allowed to set, and then, while it was still moist, the plate was dipped in a solution or bath of nitrate of silver in water; the plate then, while it was still wet and dripping, was in a condition to expose in a camera.

The colloidising of the plate was done in the daylight; the silver bath had to be in a dark room, or a room that was lighted with an orange yellow light, and all the operations from that time until the plate had been developed and washed had to be carried on either in the dark or in a modified light.

In the field, that is to say, when pictures were taken outdoors instead of in the studio, the operator had to carry his dark room with him in the form of a tent—something collapsible, as a rule—and had to carry the bath, a certain amount of washing water and the necessary solu-
times, including his camera and tripod. This picture (producing picture) illustrates with substantial correctness the paraphernalia that was carried by a man who practiced the wet collodion process outdoors. Frequently the apparatus was carried in a cart, wheelbarrow or something of that kind. It was not always carried on a man’s back.

(Picture marked Defendants’ Exhibit 1.)

After the practice of the wet collodion process, as an amateur, I next took up the gelatine dry plate process. In that process a solution of gelatine in water was made into an emulsion of sensitive silver, by adding to it bromide of potassium or ammonium, and then a solution of nitrate of silver and water. This had to be done in the dark, and the silver, containing with the bromide in the gelatine, made an emulsion of bromide of silver; the nitric acid from the silver, combined with the potassium or ammonium, was washed out in a subsequent operation, after the solutions had been allowed to set; after that washing, the jelly was dissolved and flowed upon glass plates and dried. All this was done in a dark room; and after drying, the plate was in a condition to expose at any time; it could be kept indefinitely in its sensitive condition. These plates had to be handled in a more restricted light than the wet plates because they were very much more sensitive, ten times as sensitive.

I took up the dry plate process in 1878. At that time there were a very few amateur photographers, only two in Rochester so far as I know, and they were not amateurs in the sense that we term an amateur at this time, because they were skilled photographers, had to be. They practiced photography as a pastime. There were only amateur photographers during the wet collodion days, and also at the outset of the dry plate process, in that way. It was
limited to a very few who were willing to spend the time
and trouble of learning a very intricate and difficult
process, which could be only practiced under restricted
conditions. The cameras that were in use for outdoor
work with the wet collodion process and also the dry plate
process in 1878, when I took up the dry plate process, were
known as view cameras, and they were intended to be used
on a tripod; they had a bellows and a focusing device,
ground glass and a holder for the sensitive plate. It would
generally be understood by the term “view cameras” that
they are always supported on a tripod for outdoor work.

In these early view cameras, the means for opening and
closing the lens opening for exposure was usually a leather
cap lined with velvet and fitted over the front of the lens.
When an exposure was made the cap was taken off, held in
the hand for the length of time that the exposure was to be
made, and then put back. In other words, there were
no shutters except what were known as drop shutters—
usually made by the operator himself.

I first began to manufacture and sell gelatine dry plates
in 1880, when I rented some premises and began to fit
them up in the spring and began to market goods in the
fall.

The gelatine dry plate process was a more convenient
one for outdoor work than was the collodion process.
It removed the necessity of carrying a dark room and the
solutions that were required for the wet process; it re-
duced the apparatus that had to be carried to merely a
camera, tripod, and enough holders to hold the plates that
were required.

Of these early plate cameras which were used in the
dry plate process the first that I had was known as the
stereoscopic view camera; it probably weighed 10 or 12
pounds. This picture (producing picture) shows with
substantial correctness the outfit which a photographer
operating in the field had to carry with him in the

Eastman Kodak Company: Patents
George Eastman—Direct

I first turned my attention to what is now known as the film roll system of photography about 1884 or the latter part of 1883, I think, and produced what is classed as a roll holder for operating a roll film in a camera; and the first thing we marketed was a paper film—marketed for use with this roll holder. This roll holder was a piece of apparatus to take the place of the plate holder, which is applied to the back of the camera in front of the ground glass which was taken off. This roll holder was a mechanism consisting of rollers, an exposure surface, bearings for a spool of film, and at the other end a reel adapted to take up the exposed paper; a means for indicating the paper as it was wound over the exposure surface, a device for keeping the paper under tension, and, of course, the whole thing was enclosed in a casing. It was, like a plate holder, an attachment for a plate camera, and with a plate camera the plate holder or a roll holder could be used interchangeably.

This (producing roll holder) is one. This mechanism was so fixed to the back of the holder that it could be detached at either end and swung up for the convenient manipulation of the spool of film.

(Roll holder marked Defendants' Exhibit 3.)

It was known as the Eastman-Walker Roll Holder, and patents covering it generally were issued to Walker and myself.
An advantage in the use of this roll holder over the glass plate holder resided in the fact that it enabled one to carry about a dozen times as many exposures in the same weight. In other words, for each plate holder you had a single and sometimes two plates, each plate representing a single exposure, and in the case of the roll holder you had a long strip of paper film which might hold two or three dozen exposures.

The paper film that I first used in this roll holder was a strip of the finest grained, and, at the same time, strongest paper that we could find, coated with the same kind of emulsion that was put on glass plates—the very quickest emulsion that could be made. This strip was cut up into suitable widths and rolled on spools, as in Exhibit 3. There was an advantage in the roll holder over the plate holder so far as weight of the exposure material—the sensitive material itself—is concerned,—that is to say, in the case of film on the one hand and glass plates on the other,—in that 160 sheets of 8 by 10 glass would weigh about 100 pounds, I believe—90 to 100 pounds,—and 160 exposures of paper film of that size might weigh a pound. It might weigh a little more than a pound. As to the novelty, commercially, of this film roll system represented by the roll holder and paper film, we were the first to put any such apparatus on the market; in other words, it represents the first commercial result in the way of the production of the film roll system of photography. My concern received recognition on the introduction of this film roll system represented by this roll holder and paper film from the Royal Geographic Society of England, which gave us a medal in 1885. Also there were numerous articles in the literature referring to the new
system of photography, as we called it. An article in the British Journal of Photography for the year 1885, beginning on page 547, and entitled, "The Walker-Eastman system of film photography" refers to the roll holder and paper film that I have described and refers mostly to the apparatus.

(Article marked Defendants' Exhibit No. 6.)

An article in the British Journal of Photography for 1887, on page 689, entitled "The Genesis of the Roller Slide," also refers to the roll holder and paper film as to which I have testified.

(Article marked Defendants' Exhibit No. 7.)

The W. H. Walker referred to in this article is the W. H. Walker mentioned by me when referring to the Eastman-Walker roll holder. W. H. Walker was engaged with me in the experiments which preceded the marketing of the holder and the film, and is the W. H. Walker who appears with me as co-patentee in the two Eastman and Walker patents, Exhibits Nos. 4 and 5.

Prior to the introduction of this roll holder in 1885 we had not manufactured plate cameras. The introduction in 1886 of this film roll system as exemplified by the roll holder and paper film had a substantial effect in adding to the number of amateurs. We sold a good many roll holders and considerable films. Of course the sale was limited to those who had cameras to which they could be applied. Possibly it stimulated the sale of some cameras also.

After we used this paper film in this roll holder, the kind of film that we next used was what is known as stripping film. This stripping film differed from the paper film in that the image-bearing coating could be stripped off
from the paper before printing, so as to avoid, in a great measure, the appearance of the texture of the paper in the negative appearing in the print. Patent No. 306,584 was granted to me covering this stripping film.

(Patent No. 306,594 marked Defendants' Exhibit No. 8.)

They were sold to amateurs, photographers and through dealers. There were at that time a number of photographic dealers who sold cameras. We sold first the holders to those who already had cameras, and then we tried to stimulate the sale of cameras in connection with the holders, and that added to the number of amateur photographers. By stimulating I mean showing them the convenience of this system of photography that they could now practice the art without so much labor and inconvenience in the field. At this time they all had to be skilled photographers. They had to have a dark room, and change their film, and had to develop it. The scheme of having the dealers develop the exposures had not been worked out at that time.

In the commercial production of the film roll negative-making apparatus, after the introduction of this roll holder and paper film in 1885, we next devised what is known as the No. 1 Kodak, which was placed on the market in 1888. This No. 1 Kodak was the first apparatus that was put on the market that contained everything that was necessary for a person to make a photograph—to make an exposure. It was an oblong box having at one end a lens and shutter, and at the other end the film operating mechanism of the roll holder. It was sold loaded with a spool of 100 exposures and sealed. Any novice could buy that camera and in a few minutes learn to take pictures without learning anything about the art of photography except how to point the camera and press
the button. I produce (producing camera) one of the early Kodak cameras of 1888—one of the originals.

(Kodak marked Defendants' Exhibit No. 9.)

This No. 1 Kodak camera is a hand camera; by which I mean a camera intended to make pictures without a tripod; that is to say, to be held in the hand during exposure. It is distinguished from the roll holder of 1886 and also from view cameras, in that it is a complete apparatus containing all the mechanism necessary to take a picture—to make an exposure.

"Q. What do you mean it (No. 1 Kodak) contained that the paper roll film camera did not contain? A. It did not contain anything when the view camera was provided with a shutter and a roll holder. The view camera never had been provided with a self-capping shutter, for instance. It differed in that respect, and of course in the form."

It differed from the roll holder of 1886 and the view camera with which that roll holder might be used in that the No. 1 Kodak contained in itself the lens and shutter, and other necessary parts of a camera, and also the film roll mechanism which prior to that had existed in the roll holder. So that in this one instance we had practically as an integral part of it the two things that had existed before, one in the plate camera with the photographic apparatus in the way of lens, etc., and the other, the roll holder, which continued a film roll mechanism. This differed from the view camera outfit in the fact that there was no slide over the film as there is in a roll holder. The necessity of carrying a slide was done away with, and the necessity of covering the film was obviated by a shutter which did not expose the film when it was set. Patent No. 388,850 was granted to me or my concern covering this No. 1 Kodak camera.
This No. 1 Kodak was introduced to the public with the phrase, “You press the button, we do the rest,” and that was the beginning of the use of that term by the Eastman Company. It meant that all the purchaser had to do was to press the button to make a picture, and it marked the introduction of a system of dividing the work of making photographs, the amateur merely pointing the camera and pressing the button, and the developing and printing being done at the factory. This pressing of the button actuated the shutter device. This 1888 Kodak camera was the first apparatus that ever accomplished the object of dividing the operation of making photographs. The stripping films, before referred to by me, were used in this No. 1 Kodak at the time of its introduction in 1888. The introduction of this 1888 Kodak camera opened amateur photography to the whole world. We sold thousands of them to people that had never had any interest in photography, and the effect was to increase the number of amateur photographers very largely. This No. 1 Kodak of 1888 was sold to the user loaded with a spool of 100 exposures and sealed so it could not be tampered with, and with the understanding that if sent back to the factory it would be reloaded with a spool of 100 exposures, and the exposed spool of film developed and printed, and the pictures furnished to the customers, all for $10; that is to say, we did all the work of developing the strip of film and furnishing a print from the negatives and supplying a new spool of film of 100 exposures for the sum of $10. The price of this No. 1, loaded, was $25. Shutters were sometimes used in cameras which were in existence before the introduction of this No. 1 Kodak in 1888, and with the dry plates they were, I think, universally used. In the wet plate the cameras did
not have shutters, but had caps for the lens opening. These shutters that were used with the view camera, however, were not self-capping, by which I mean, you had to cap the lens while you set the shutter. With the No. 1 Kodak you did not have to do that because the spring was wound up behind the shutter which continuously revolved. And in the case of view cameras that had shutters, the exposing leaves or wings of the shutter device which, in passing across the lens, left an opening for the exposure, had to be set back across the lens. The reverse movement and setting also caused an exposure. In the No. 1 Kodak that action did not take place.

In the way of providing an apparatus or film in the film roll system of photography after the introduction of this 1888 Kodak camera, we next substituted a transparent film for the stripping film. In the transparent film the paper base was replaced by a sheet of nitrocellulose. This nitrocellulose film was made in 1806 or 1886. I had been experimenting on and off for several years, and the experiments which resulted in the production of the nitrocellulose film as introduced in 1888 or 1889 were made by Henry M. Reichenbach under my instructions some months before April, 1889, the filing date of the application for Reichenbach patent No. 477,202, granted December 10, 1889—I don’t know just how long. Reichenbach was a young man whom I got through the University of Rochester. He had been an assistant in the chemical laboratory there. I think he had been there a year or two at that time. He entered our employ about 1886, when about 23 years old. He had had no previous experience in photography. Preceding the commercial manufacture and introduction of this transparent nitrocellulose film I set Reichenbach at making some experiments with a view to making a varnish to replace the gelatine skin which we used to reinforce the image that had been stripped from the American strip.
ping film, and he brought me a plate that had been
varnished, the varnish practically stripped; the sheet of
varnish was thick at one end and thin at the other. I
asked him how he made it. He told me he had made it
out of a solution of celluloid, and when he showed me that
solution I decided that it would not be any good for
varnish, but that it was a solution for making film base
which I had been looking for. We immediately applied
it to the manufacture of film. These experiments resulted
in the production of a process and apparatus to manufac-
ture this film that was introduced in 1889 or 1890. The
apparatus consisted of a glass plate, with a spreader
travelling lengthwise of the plate which scraped the solu-
tion of nitrocellulose on it in a thin and even sheet; the
glass was plate glass carefully levelled so that the sheet
would maintain its evenness until it was dried. The
solution or dope, was a solution of nitrocellulose in wood
alcohol and with the addition of fusil oil, anil acetate
and camphor.

Patents issued to me for the apparatus and to Reichen-
bach for the process, and I produce copies of same.

(Patents Nos. 477292, 471609 and 479995 marked
Defendants' Exhibits 11, 12 and 13.)

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We got the longest glass plates that had ever been made
at that time, from France; they were about 20 feet long;
put 10 of those end to end, grinding the ends so that they
would make a good joint, and providing an apparatus to
take up the shrinkage, so that it made a continuous table
of about 200 feet long and about 14 inches wide. The
hopper contained the dope or solution and travelled back
200 feet and made a continuous coating of film 200 feet
long; every 20 feet there was a line across the film, which
was caused by the imperfection of the joint between the
glass plates which we never could make quite perfect. The
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nitrocellulose base when it was dry was about .0023 of an inch thick.

After the formation of this base in our process, as we actually practiced it, the coating of nitrocellulose was given a coating of what was called a "rubber" to make the subsequent coating stick, then the room was darkened, cooled down, and the nitrocellulose coating was coated with gelatine emulsion in very much the same way and by the same apparatus that spread the coating of nitrocellulose; not exactly the same coating device, but of the same nature; that was dried and then the whole thing was stripped off from the glass by starting it at the end and putting it on a roller which travelled the length of the table and wound up the film as it stripped off from the table; the film was at that point in a finished condition ready to cut up and pack. That (producing film) is a spool of the film that I have described. I cannot state when this particular spool of film was made, but it is in general appearance exactly the same thing as the film manufactured by my concern in 1889 or 1890.

(Film marked Defendants' Exhibit No. 14.)

We began the commercial manufacture and sale of the nitrocellulose film about which I have been testifying about July or August, 1889. It was sold under the name Eastman's transparent film.

The "rubber" or the emulsion that I have referred to was used to make the emulsion stick to the nitrocellulose base. This rollable transparent film when introduced by my concern was absolutely a new product. The commer-
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The introduction of this transparent film in 1882 was another step in the development of amateur photography. The Kodak had practically created the art of amateur photography, and this gave it an impetus. The Kodak enabled anybody that had no knowledge of the art to make photographs—snapshots, and this simply made it easier, and improved the quality of the result—made it easier because you did not have to remove the negative bearing film from its support, the paper, and replace it with the gelatine skin, as in stripping film. With this nitrocellulose film the stripping was entirely unnecessary because the nitrocellulose base was transparent and structureless. It had no grain like the finest paper had.

The effect of the introduction of this transparent nitrocellulose rollable film was very substantial on amateur photography. The business which had already gotten a big impetus from the Kodak got another one. We received a medal from the Photographic Society of America at Boston, in 1886, I think it was, for the best substitute for glass. I think the award was for the best substitute for glass in photography, because of our introduction of this nitrocellulose transparent rollable film. We also received recognition from the literature of the art at that time for the contribution of the transparent film and also for the introduction of the Kodak in 1888—both were very well received—enthusiastically received. The article in the British Journal Photographic Almanac and Photographers Daily Companion for 1886, page 690, entitled ‘The Kodak,’ refers to the Kodak about which I have been testifying.

(Article marked Defendants' Exhibit 13.)

The British Journal of Photography is the best known technical journal published in English in the art of photography. Its almanac is an epitome of the year's progress and has the widest circulation of any such pub-
lication and is looked upon by people in the art as an authority than which there is no better. The article in British Journal Photographic Almanac and Photographers Daily Companion for 1890, appearing on page 564, and entitled "The Eastman New Transparent Flexible Film" refers to the film about which I have been testifying. I don't know who John Jackson is. These articles were not solicited or paid for by me or my concern. My concern was quite an advertiser in this British Almanac. No, not at that time the largest advertiser—very small. We were entirely a new concern in those days. The circulation of British Journal of Photography and British Journal Photographic Almanac and Daily Companion was exclusively among photographers in this country and in England, as far as I know. The price at which that almanac is sold is a small price, and the chief matter in the almanac, as far as size goes, is advertising matter. The circulation is about 55,000 altogether. It is sold out in advance usually. It is the highest authority in its line without any question.

(British Journal Photographic Almanac and Photographers Daily Companion, article appearing on page 554 of that journal for 1890 marked Defendants' Exhibit 16.)

"The Kodak" referred to in British Journal of Photography, article for the year 1888 appearing at pages 585 and 586 entitled "The Kodak," is the Kodak camera to which I have referred.

(Article marked Defendants' Exhibit 17.)

The transparent flexible films referred to in the article appearing in British Journal Photographic Almanac and Photographers Daily Companion, 1891, at pages 720 and
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721, are the Eastman transparent films to which I have referred.

(Article marked Defendants' Exhibit 18.)

The Court: These articles are not going into the record for the purpose of proving any facts contained therein or establishing the accuracy of anything the articles imply; merely as tending to show that the art looked upon these products at this time with favor, and, an counsel said, with some degree of enthusiasm.

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British Journal of Photography article entitled “Advance in Pellicular Negative” appearing in that journal for the year 1890, at page 17, refers to the Eastman transparent film to which I have referred.

(Article marked Defendants' Exhibit 19.)

The camera referred to in an article in this same journal for the same year at page 21 entitled “A New Kodak,” is the Kodak camera to which I have referred and refers to the No. 2 Kodak which was put out in 1889.

(Article marked Defendants' Exhibit 20.)

I have referred specifically to the roll holder as increasing the number of amateurs, to the Kodak camera of 1886 as increasing the number of amateurs, and to the transparent film in 1889 as increasing the number of amateurs. For the purpose of a more convenient reference, I give a brief resume as to the effect on the film roll system of photography and amateur photography, of these three different things, roll holder, the Kodak and the transparent film in the order of their importance and in their chronological order: Of course there were only a few amateur photographers when we introduced the roll holder, I
have stated that. To be an amateur photographer in those days you had to carry all the paraphernalia that has been described, and use a tripod—there was no such thing known as snapshotting—look a picture of things that are stationary. We sold those roll holders to people who already had view cameras, and we also stimulated the sales of cameras to which the roll holders were applied, but the total sales were small. The Kodak changed all that. The roll holder removed part of the trouble, but the Kodak changed it all. A person could take the Kodak and go out and make pictures after five minutes’ instruction. That was actually done by people that knew nothing about photography. The Kodak was a snapshot camera, because it had a self-capping lens, was self-contained, did not require a tripod. All you had to do was express in that phrase “you press the button,” and that appealed to thousands of people, and that was, of course, what created amateur photography. There was not any such thing as amateur photography, as we know and understand it, until that time. According to the present day view of amateur photography, what is meant by an amateur photographer is a person who presses the button; they form the great bulk of amateur photographers now. Persons who have no skill in photography may now take pictures successfully. Well, anyone that could point a little instrument like this Kodak (indicating) at an object, hold it fairly steady and press the button (pressing button and snapping) was enabled to take a picture and just as good a picture as anybody could possibly take. It immediately opened the art of photography to the world. Children are able to use it quite extensively. There are cases where children six years old make good pictures. They would sight the object, take the negative, and press the button. We sell a camera for a dollar and any child can use it (indicating camera) and thousands upon ten thousands of children have used that camera.
The transparent film was a third step; it simply made it easier to develop the negatives and prepare them for printing; it enhanced the quality of the resulting negative. While paper negatives produced good results and in a great many cases very good results, if the emulsion had deteriorated in the slightest degree, it deteriorated in such a way as to show the grain of the paper—to accent the grain of the paper in the photographic print; nothing could be done to prevent that, except to do away with the paper. That grain often showed in the transferred negatives, made on stripping film, because the grain of the paper had affected the silver image. That was all done away with at a stroke with the transparent film; that was structureless and if the emulsion did deteriorate, as all very sensitive emulsions do deteriorate from the time they are made, it deteriorated evenly and did not show in the print. It merely required right printing to get a given effect in the finished print.

I referred to this nitrocellulose film as a transparent film and yet in Defendants' Exhibit 14 the film is as a whole not transparent. That is owing to the fact that in this spool the film has a coating of silver emulsion, and the greenish yellow is bromide of silver which exists in the gelatine coating in the form of emulsion; the silver is very finely divided, and it is that silver when acted upon by light, afterward by the developer, that makes the negative, and all the silver which is not used in making the image is dissolved away in the fixing operation, so that the shadows of the negative become perfectly clear. Then in the negative the shadows are represented by transparent film; the base and the coating of gelatine which still exists upon it, without any silver in it; of course the gelatine is also transparent. The gelatine itself is transparent, and the thing that makes it non-transparent is the presence in it of the silver. So that in the negative, after the develop-
ing and fixing, the silver is taken away from the parts that represent the shadows, so that that part of the gelatine is transparent.

This roll of material is a piece of what we call Cine film base. It is the same base that is used for camera films, but about twice as thick. That is about .005ths of an inch.

(Film marked Defendants' Exhibit 22.)

It constitutes the base for cinematograph film. To make a complete film, this base would have to be coated with gelatine emulsion. Except for the thickness, this is the same kind of base as is used for the roll film for the hand camera. Care and skill are involved in the manufacture of the nitrocellulose base for this transparent film, and many difficulties of manufacture are present. In the first place the base of the product is cotton. That has to be carefully selected and treated, to remove grease, and dried. Those operations, although they are simple operations, have a bearing upon the final quality of the film. After it is dried it is subjected to the action of nitric and sulphuric acid, and the time of immersion in the acid depends whether it shall be soluble or explosive. A variation of a very few degrees in the temperature of the acid will affect very materially the solubility of the product. If it is not soluble enough,—the "dope" which it is called,—the film, after it has been developed, is useless; it contains microscopic particles of cotton; that is not objectionable in camera film, but very objectionable in motion picture film because of the enormous magnification of any particles in the film. After the nitration, the cotton has to be washed for a long time in cold water. We wash it for weeks. If the cotton, on the other hand, is too soluble, it makes too thin a dope and affects the thickness of the film; also if the cotton has another quality of being viscous, if there is a variation in the
viscosity of the solution, that affects the thickness of the film, and the thickness of the film cannot vary more than about a quarter of a thousandth of an inch. The requirements of the motion picture art to-day are so exacting that we have to make film by the mile, in sheets about 48 inches wide; they do not vary over a quarter of a thousandth of an inch from standard day in and day out; machines that we have had running for 6 months without stopping have to run so that they will keep within those limits. Then there is another quality of the cotton. Must make a film which is not brittle, very easy to nitrate the cotton so that it will make a brittle film. It may vary so that you cannot make the emulsion stick to it in spite of the substrate which has been mentioned. Now, the trouble that comes from the emulsion not sticking is that it may not be found out until after the motion picture maker has printed his pictures and sent them out to the public. By not sticking I do not mean that it won’t stick sufficiently to go through the operation of making the picture, but stick tight enough so that it won’t be disturbed in the very rough usage that the film gets in the projecting machines. The film has to be perforated and is run through the projecting machine at the rate of about 16 pictures a second; it has to be stopped and started 16 times a second. Of course the film being very thin has pretty hard usage, and if the film either breaks or the picture separates, it is a very serious thing. In fact it would ruin the business of a picture maker if his film has that defect very extensively. All these troubles apply to the film used in the snapshot cameras, except to the degree of the whiskerings.

The cotton after it is washed is dried and then dissolved in some suitable solvent like acetone and wood alcohol, and is filtered very carefully, formed into a very thin sheet which is deposited on a wheel, which has a metallic polished surface; while it is on that wheel it is subjected to a blast of tempered air; then it is passed over rollers and dried and wound up. Now, the solvents which are
used have to be very carefully distilled, and any variation in the composition of this solvent, any impurities, are liable to show in the results which are obtained by the photographer who uses the film; it may cause the film to fog generally, or in spots, or lessen the sensitiveness, or alter the photographic quality of the emulsion. Then comes the emulsion. When emulsion is used for negative making it has to conform to certain requirements as to speed. Now, that speed has to be very great, and the limits of variation are very small that are allowed by the user. it must also be capable of making snapshots or negative films in an ordinary light. The exact cause of the extreme speed in emulsions is not known. Emulsion-making is largely empirical, but the great experts have succeeded in making an emulsion that is very uniform. It is easier to make emulsion for glass plates than it is for film, because glass is quite indifferent to emulsion; it has no affect chemically on the emulsion, whereas film has; and as I have said, any impurity in the solvent used for the nitrocellulose, or perhaps some variation in preparing the cotton at any stage, may affect the emulsion. Now, the effect on the emulsion by any of these impurities is not always shown in the factory. Sometimes they do not appear until after the film has been on the market. When the emulsion is coated on the film it is done in the dark or in a very dark room, and dried, and the drying of the emulsion has to be done under atmospheric conditions that are controlled by ice machines and water tempering devices, so that practically the same atmospheric conditions are obtained in summer on a hot muggy day as in winter. Now, the necessity for great uniformity in film is not that film cannot vary and still make good pictures, but the man that uses it expects to get exactly the same results under any conditions that he uses it in; either his business depends upon it or perhaps the success of his trip. If he is using it as an amateur, he has got to depend upon the film — upon the uniformity of the film — as he depends upon almost no other product that he uses.
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In the manufacture of the nitrocellulose base we began to use a wheel about 1900. I think— I think it was somewhere about 1900. I have not any memorandum of that. Before that we made them on the tables that have been described here. This wheel was used after the table and made the film without those joints that were produced by joining the sheets of glass together. Those joints were a marring of the film and caused a great deal of waste. These glass tables that we used before we used the wheel were about 200 feet long with ten joints, and the length of the table limited the length of the film. We ran wheels continuously, night and day, week in and week out. Some of them ran as long as 8 months; we cut the film off every 2,000 feet. The diameter of the wheel is about 15 feet and the width about 4 feet; but the film after it is taken off the wheel, passes over a long series of heated rollers; it is only partially dried when it comes from the wheel; it takes it 30 or 40 minutes to dry before it gets out of the machine. The dope is dropped onto this 15-ft. diameter wheel in a thin sheet; then the wheel travels around and the dope when it reaches a certain point is dry enough—it has been dried into a film so that it can be stripped off that wheel, and then it goes through a drying chamber much the same as the Fourdrinier machine where the pulp comes off from the blanket barely strong enough to pass to a roller. We do not have a spreading device on this wheel. After the film is dried in this drying chamber it is coated with emulsion; then it is cut up into the lengths and widths required. That is true both of the hand camera film and the cinematograph film. We started to make this nitrocellulose film in 1889 and continued to make that nitrocellulose reliable film for hand camera purposes from that time down until now. We are making it now. We started out with a process involving the use of nitrocellulose, wood alcohol, camphor, fusil oil, and amylnitrate, that is to say, we began with that process in 1889, but reduced the proportions of camphor and amylnitrate during the time that we
used the glass tables, and we discontinued the use of amyl-acetate, I think, about the time that we adopted the wheel process, and I think we reduced the amount of fuel oil, but I am not sure of it.

We reduced the camphor and amylacetate—finally discontinued the amylacetate, to lessen the shrinkage of the film, among other reasons. The reduction of the camphor and the amylacetate and the elimination of the latter, resulted in quicker drying because amylacetate is a very slow evaporating fluid. This rapid drying increased the output.

In August, 1888, we began the manufacture of cinematograph films. We made the first film for Edison—well, we sold it to him, but we had no large business in it until it began in 1888, when the apparatus for exposing and projecting it had been perfected, and it became a commercial affair. The Eastman Kodak Company made the first motion picture film. That is true of this country and abroad—anywhere. That referred to that August, 1888, film that I just mentioned. It was practically the same as that used for Kodak purposes except that it was twice as thick.

In the moving picture or cinematograph art a transparent, rollable film is a prime necessity because the light which produces the picture on the screen has to pass through it. You can use sand-blasted support, but it is not as good. Nobody does use it or would use it.

The standard length of motion picture film is a thousand feet in an exhibit apparatus. It is cemented together. It is made out of lengths of about 200 feet or less. The standard raw stock lengths are 200 and 400 feet in continuous lengths. Although I have heretofore referred to there being a greater necessity for certainty of the emulsion sticking to the base in a moving picture film than in a hand camera film, the two films are not different. In a way it is just as important that an amateur's film should be perfected as a motion picture man's, but there is not so much money in—
1528 volved. That is all. When we started out to make nitro-
cellulose films in 1889 we used a substratum consisting of
salicylate of soda and water and continued the use of a sub-
stratum of that kind for several years, I think. After that
we used one the composition of which is a secret, but in
general it is a material which is dissolved in a solvent
which is a solvent of nitrocellulose. The material used in
that was nitrocellulose itself. No, I am mistaken. As a
matter of fact at the moment I have forgotten just what
that "web" was. I think it was gelatine, which was dis-
solved in a solvent which would dissolve both gelatine and
nitrocellulose. We used this new substratum because the
salicylate of soda was not satisfactory, in that you could not
depend on its action. I think we used this new sub-
stratum with both the hand camera rolled film and the cin-
ematograph or moving picture film. The Eastman Kodak
Company own a patent covering this process of applying
a substratum to a nitrocellulose base, and I produce a
copy of that patent.

(Patent marked Defendants' Exhibit No. 23.)

I have heretofore referred only to nitrocellulose cin-
ematograph or moving picture film. For two years, be-
ginning 1900, we also made a cellulose acetate non-
flammable film exclusively for our customers in this
country. By "exclusively" I mean our motion picture customers
used it exclusively for two years. We did not refuse to
furnish it to anyone outside of them.

Going back to the hand camera roll film system of pho-
tography, I remember the introduction of the so-called
A. B. C. daylight loading Kodaks and carriers by the
Eastman Kodak Company or the Eastman Company in
1891. I produce one of those cameras.

(Camera marked Defendants' Exhibit No. 24.)
This camera is intended to be used with a spool of film which is enclosed in a box having a longitudinal slit along one corner, the film being provided with a strip of black calico at each end, so that when the strip of black calico is extended across the exposure bed it can be attached to the spool in a similar box with a slit, and after the exposures are made taken out of the camera without exposing any of the film, the strip of black calico on the other end of the film protecting it from the light. I produce a patent to the Eastman Kodak Company, or its predecessors, covering generally this form of apparatus.

(Patent No. 477243 marked Defendants' Exhibit No. 25.)

This apparatus was the first daylight loading film on the market and had advantages over the film roll system preceding it as exemplified, for example, by the Kodak of 1888, in that a man who did not have a dark room had only to send his spool to the dealer to develop it. A man who had no dark room—and of course that was almost the entire number of Kodakers—had to send his Kodak back to the dealer to have it re-loaded—the whole camera. He could not take the roll out of it. He had to send the Kodak itself with the roll in it to the dealer—the whole camera, and the dealer removed the spool of exposures in his dark room, loaded the camera with a new spool, and sent it back to the customer. Of course that made express charges or necessitated the visit of the Kodaker to the dealer. With the new A. B. C. camera the Kodaker could buy a stock of spools and change himself in any light. That was just another advance, another step in the making of the art easier. He would merely send the spools back to have the picture developed, and retain the camera. In the one case, that is to say, in the
1534 case of the A. B. C. daylight loading camera he would send back the rolls to be developed, and then reload the camera himself and still continue using it, while his other pictures were being developed, and in the case of the Kodak of course while the camera was out of his possession he could not take any pictures. There was no mystery about loading the old Kodak. You could take it down to a dealer and get it loaded while you waited or something of that sort. You didn’t have to send it to Rochester. Of course that was a great difference in convenience, because a man might get to the end of his roll of film in the midst of an excursion when he wanted to go right on.

1535 This camera (producing camera) is known as a Pocket Kodak, that was introduced by me in 1885. The term “pocket” means an instrument that you can put in your pocket.

(Camera marked Defendants’ Exhibit No. 26.)

That camera was the first pocket Kodak, the first pocket camera, in fact. In 1885 it sold for $5 to the user. I produce a patent owned by our concern which covers this form of camera generally.

1536 (Brownell patent No. 579,949 marked Defendants’ Exhibit No. 27.)

This camera (producing camera) is a No. 1 Folding Pocket Kodak. “Folding pocket” means it folds up and has to be extended in order to make a picture. The “pocket” part of the phrase means it folds up small enough to put in your coat pocket. That camera was introduced by my concern in 1886 and was the first pocket folding film camera having the spool in front of the focal plane.

(Camera marked defendants’ Exhibit No. 28.)
I produce two patents which cover generally this folding pocket Kodak that I have just referred to, No. 640,153 to F. A. Brownell, and Design Patent No. 29,378 to F. A. Brownell. One has expired and the other has not. The design patent was only granted for 14 years.

(Patents marked Defendants' Exhibits Nos. 29 and 30.)

This camera (Exhibit No. 21) is what is known as a No. 1 Brownie. It was first introduced by my concern commercially in 1900. It sold for $1 to the user. It was intended to appeal to school children and young people generally. It was the first very cheap camera of the kind, a very low-priced camera. I produce a copy of patent No. 725,094 to F. A. Brownell, covering the camera that I just referred to (Exhibit No. 21).

(Patent marked Defendants' Exhibit No. 31.)

This carton is a cartridge spool of our non-curling transparent film.

(Carton marked Defendants' Exhibit No. 32.)

By "non-curling film" I mean that the nitrocellulose base has a coating on the back of gelatine, which balances the gelatine emulsion coating on the base and keeps it from curling. A film not double-coated shrinks and tends to curl whenever it is not under a strain of some kind like pressure in a printing frame, or something of that kind. This tendency is overcome by the back coating of the film with gelatine, so that when it is out exposed to the air on the table it will remain flat. We commenced to manufacture and sell such non-curling film in 1903. Such non-curling film was a commercial novelty at that time; it was a new thing, and marked another advance.
in the art. At the time this non-curling film was introduced in 1903 by the Eastman Kodak Company, the films of all other manufacturers and dealers in rollable films were all curling. After the introduction of this it was copied by all the manufacturers. When speaking of a film as curling, I mean one-coated just with the single emulsion coating on one side. I produce copy of patent 441,831, owned by my concern, covering this non-curling film.

(Patent marked Defendants' Exhibit No. 33.)

1541 This film roll which I produce is a cartridge spool of our film provided with what we call the duplex paper. By “duplex paper” I mean the paper protecting the film instead of being black throughout, is black on the inside and red on the outside. The reason for this duplex paper is to enable us to print the numbers of the exposures on the paper in such a manner that they would not affect the film. The numbers on the black paper had to be printed with a pigment, and under certain circumstances that caused the offsetting of numbers on the film where the face of the film touched the numbers. At that time we used black paper. The duplex paper enabled us to print the numbers with a dye which has the same absorptive qualities in the atmosphere as the paper itself. In other words, the dye does not affect the surface of the paper physically.

(Film roll marked Defendants' Exhibit No. 34.)

I produce copy of patent 567,458 to Harry LeB. Gray, owned by the Eastman Kodak Company, covering generally this duplex paper feature.

(Patent marked Defendants' Exhibit No. 35.)
This duplex paper cartridge was a new thing. It improved the quality of the goods and we have used it extensively ever since. This apparatus (Defendants' Exhibit 37) is a developing machine manufactured and sold by the Eastman Kodak Company. They began the manufacture and sale of these developing machines in August, 1902; not in this particular form, however. In the first form, the developing and winding of the film into the apron were performed in one receptacle. This was metal. The developer was poured into this (indicating) and the film was kept in motion by turning the crank during the whole time of development. In this machine the film is wound into the apron and then the apron is transferred to the tank and the developer poured into it, and this is not kept in motion during the development, but merely turned over once or twice. The Eastman Kodak Company came to manufacture and sell these developing machines, as follows: Mr. A. W. McCurdy, who was then the Secretary to Dr. Alexander Graham Bell, wrote to me from Washington that he had a machine for developing film. He wanted to come to Rochester to demonstrate it. I made an appointment with him. He came there, showed me his device and I had it tested by one of our experts and I told him we did not want it. He asked why and I explained to him that it was defective in that it would only make a good negative when the exposure was exactly right. I told him that it took away from the film the quality which we had been working to put into it for years, that is what we called latitude. Latitude in film is the quality which enables you to get practically the same result from an exposure, which is one-fiftieth of a second, or five-fiftieths of a second; with his device he could get a good result perhaps on the two-fiftieths of a second exposure, and all the rest would be bad. He asked me to take the machine as it was and perfect it and I told him that we did not care to do that, that he was the
man to do it. He said he was about all in, as he expressed it; but he took it away and shortly came back and said that he had overcome the difficulty. We tested it again, and we made a contract with him. This developing machine is used as follows: The spool of film having been exposed is placed on the centers of the machine; the end of the black paper is attached to an arbor in the machine, from a second arbor, which contains what is called an apron; the end of the apron is taken and also attached to this same arbor, as the paper or film; a cover is then put on the box, and the film and the apron are rolled together; the apron has raised edges of rubber which prevent the apron itself pressing on the face of the film; when the film is wound completely off it is protected by the coil of the apron outside; the whole spool, containing the apron and the film, is then removed from the box and spool dropped into a tank containing the developer; a cover is put on the tank; the developer allowed to act for four or five minutes, then the tank is turned over, allowed to act for a few minutes more and then turned back again and the development finished according to a table which is published in the Directions, and which consists of a number of minutes, according to the temperature of the developer; the spool is then taken out of the tank and the film separated from the paper, washed and fixed in the ordinary manner. The first form of the apparatus put out by us did not involve the transfer of the spool of film and apron from the winding box to a developing tank, because the developing box was made of metal and would hold a developer itself; that form of apparatus required the continual rotation of the film while it was developing, and that was rather tiresome. The reason that the film has to be either rotated or reversed is that the action of the developer, when at rest, tends to streak the negative.
I produce patent No. 647,900 to Arthur W. McCurdy, owned by the Eastman Kodak Co., covering generally this machine (Defendants' Exhibits 36 and 37).

I have referred specifically to certain film roll cameras as first produced at a certain time, beginning with the No. 1 Kodak in 1888. My concerns, however, were not limited to the particular models or sizes of cameras that I have specifically referred to, but we introduced new sizes and models from time to time. And we have continued to do so down to the present time. By different models I mean different constructions, and the differences in construction would represent all sorts of details. These changes, as a rule, either tended to make the camera simpler or cheaper. We have always endeavored to keep out of our apparatus superfluous details, that some manufacturers call talking points. The changes that we made were usually useful, or else they cheapened the construction.

As to prices to users, the first Kodak made a picture 2½ inches in diameter, circular in shape and cost $25. The present 3-A Camera makes a picture 3½ by 5½ inches and sells for $25. The $25 was a plain box camera that had an uncorrected meniscus lens, and a shutter that was not variable as to speed. The 3-A Camera has a rapid rectilinear lens; is folding; has a shutter which is variable as to speed; has what is called a brilliant finder, and altogether a very superior article. The most popular exposure size camera among the high priced cameras such as the folding lines in this country is the 3-A, 3½ by 5½;
in Europe what is called No. 3, 3½ by 4½. Of course we sell vastly greater quantities of the Brownie line. I produce one of those 3-A Kodaks. That is the successor—development of the No. 1 which was put on the market in 1898, the No. 1 Folding Pocket. This 3-A Folding Pocket was put on the market probably ten or twelve years ago. I produce a roll of motion picture film, called "cine" film for short, made by the Eastman Kodak Co. It is a cellulose nitrate film.

(3-A Kodak marked Defendants' Exhibit No. 39.)
(Cine film marked Defendants' Exhibit No. 40.)

These perforations at the opposite edges of this cine film are for operating the film in the projecting machine or the taking machine, as the case may be. The perforations hold the film in place; they register the film; by an intermittent movement bring successive pictures into place. Harry Left Gray, to whom some of the patents hereof referred to by me have been granted, is one of our superintendent at Kodak Park. Frank A. Brownell, to whom some of these patents were granted, was with the company as head of its camera works for many years. He designed most of those cameras which I have shown. When he came with us he did not have a camera business of his own. After he came with us he was first contractor, and then that arrangement grew unwieldy and we took over his plant and he made goods on a commission, and he finally left us to go into the gas engine business on his own account. Some of these patents that I have referred to were granted to the Eastman Dry Plate Company, and others to the Eastman Dry Plate & Film Company and to The Eastman Company. I first began business in my own name, then formed a partnership with Henry A. Strong, doing a business under the name of The Eastman Dry Plate Company, January, 1881, that was not incorporated; we sold out to Eastman Dry Plate &
Film Company in October, 1884; that company sold out to the Eastman Company in December, 1889, and that company sold out to the Eastman Kodak Company in May, 1892. I have been treasurer and general manager of all the companies.

The apparatus which I produce is the McCordy developing machine in its first form, the form in which we marketed it first. That is water tight. The sheets are back here so that when the film is on this side, the developer can be put in it. That is the apron which protects the film. The operation is this: Put the developer in there first, then connect the end of the apron and the film, put on the cover and wind it in the developer, which is in the second compartment.

(Developing machine marked Defendants' Exhibit No. 41.)

I recall the acquisition by the Eastman Kodak Company of the Boston Camera Manufacturing Company. The facts connected with the acquisition by the Eastman Kodak Company of the Boston Camera Manufacturing Company were as follows:

We had been making a film spool of the type that is now known as the cartridge spool, and a patent was issued to Turner. We submitted this patent to our counsel. He advised us that if we continued to make these spools we would infringe that patent, and so we immediately took steps to acquire a license under it. We had interviews with Turner, and finally secured a license. A little later on we purchased the sole right to the patent. Turner was only making—or selling—a film which was covered by that patent and cameras which used that film, and in a conversation between said Turner, his attorney, a Mr. Roberts, W. B. Philipp, of New York, our counsel, and myself, the said Turner stated, in sub-