

May 5, 1925.

1,536,341

M. B. HODGSON
DENTAL X RAY FILM PACKAGE

Filed July 14, 1920

2 Sheets-Sheet 1

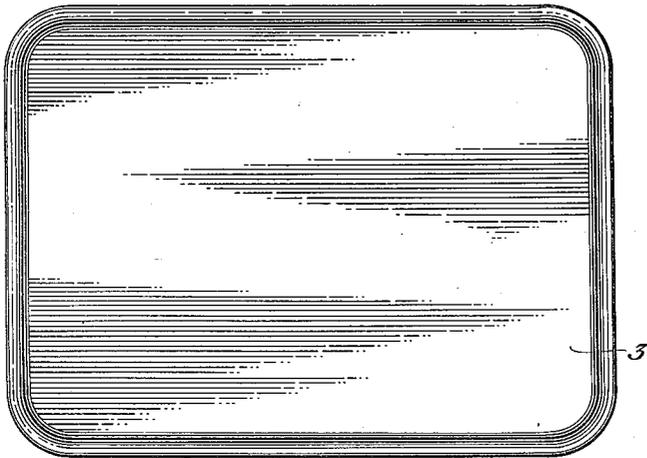


FIG. 1.

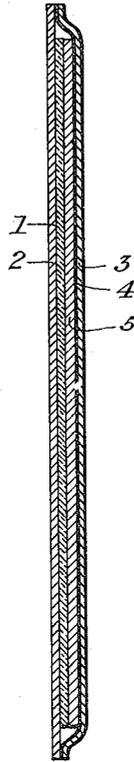
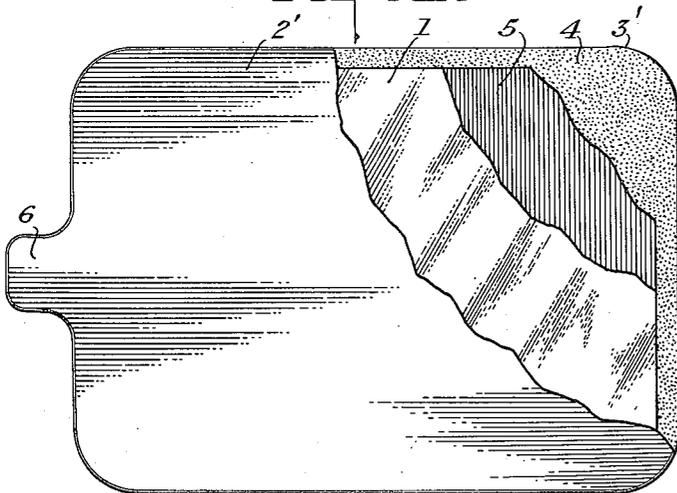


FIG. 2.

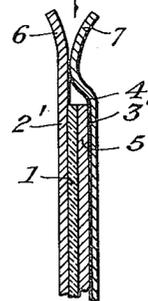


FIG. 3.

FIG. 5.

WITNESSES:

Edward Stewart

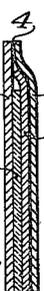


FIG. 6.

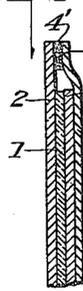


FIG. 7.

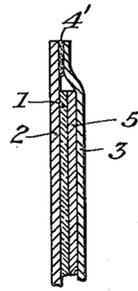


FIG. 4.

INVENTOR

Millard B. Hodgson,
BY *R. L. Stinchfield*
N. M. Perrins
ATTORNEYS.

May 5, 1925.

1,536,341

M. B. HODGSON

DENTAL X RAY FILM PACKAGE

Filed July 14, 1920

2 Sheets-Sheet 2

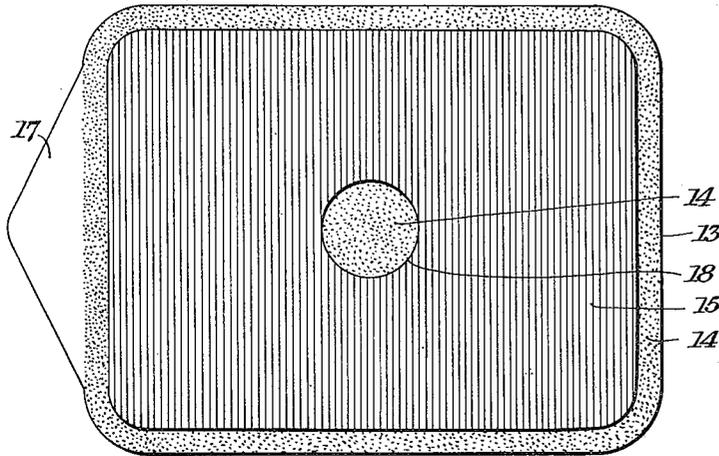


FIG. 8.

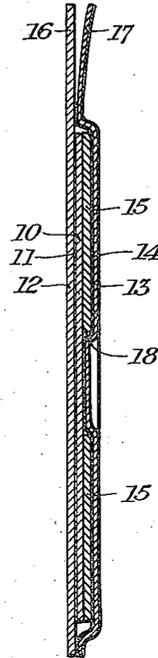


FIG. 9.

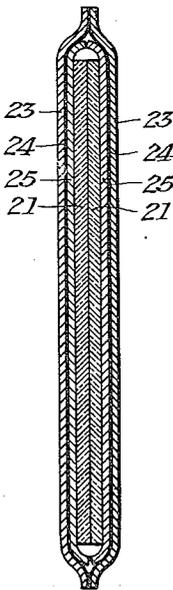


FIG. 10.

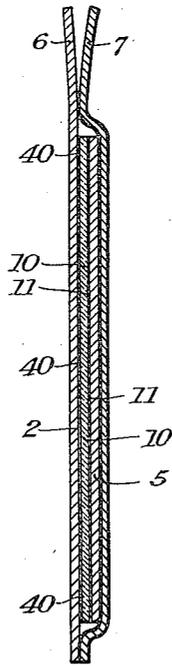


FIG. 11.

WITNESSES:

Charles H. Stewart

INVENTOR

Millard B. Hodgson,
BY *R. L. Stinchfield*
N. M. Parris
ATTORNEYS.

Patented May 5, 1925.

1,536,341

UNITED STATES PATENT OFFICE.

MILLARD B. HODGSON, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

DENTAL X-RAY-FILM PACKAGE.

Application filed July 14, 1920. Serial No. 396,188.

To all whom it may concern:

Be it known that I, MILLARD B. HODGSON, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Dental X-Ray-Film Packages, of which the following is a full, clear, and exact specification.

10 My invention relates to dental X-ray film packages designed for individual exposures, each package being light tight and sold as an article of manufacture ready for use, and remaining unopened until the sensitized film is to be developed after exposure to X-rays.

15 It is desirable that such a package be at all times easily opened, that it permit of ready manipulation in the dark room, that it shall be comfortable to the patient, that it be compact, thin and flat; as well as easy and cheap to manufacture; that it shall not be injuriously affected by water under normal operating conditions, and that the injurious effects of secondary rays be avoided.

20 It is further desirable in such a package that while the package be sufficiently flexible to be curved or bent by slight pressure when necessary to fit the shape of the part of the oral cavity to be radiographed, that it shall not retain this distortion, but will when pressure is released regain its normal flat condition. It is customary for the patient to hold the package in position. If the wrappings of the package are of such permeable material that they tend to hold any shape into which they are pressed, and to overcome the natural resilience of the sensitized film, the package may be given a permanent distortion; and if the patient at first presses the package into the wrong position and shape, and thereafter presses it into a different shape, it may become badly distorted, whereas if the natural resilience of the film is stronger than the tendency of the wrapping to assume a set position, the package will always tend to flatten out and an incorrect curvature will not remain. Moreover the used packages are more easily piled in the receptacle provided for them.

50 The objects of my invention are to furnish a package that will meet the above requirements and others that will appear hereinafter. I have discovered that a package that is thin, convenient, easy to manufacture, and not uncomfortable to the patient

may be made by enclosing the film with suitable protective paper between two flat protective sheets which are caused to adhere at their edges by a waterproof, slow-drying, flexible adhesive. Such a package is easy to open since the covers can be readily stripped apart. Moreover if the salt of a heavy metal is incorporated with the adhesive the injurious effects of secondary radiation are overcome while the package is not made so permeable that it will retain any shape into which it may be bent, as tends to be the case when metal foil is used. By making one protective sheet of waterproof material and attaching the film to it by waterproof adhesive, this sheet can be used as a means for manipulating the film in the photographic baths.

Reference will now be made to the accompanying drawings, in which the same reference characters refer to the same parts throughout, and in which

Fig. 1 is a plan of my improved package;
Fig. 2 is a section thereof;

Fig. 3 is a plan of a modified package with certain wrappings torn away in part;

Fig. 4 is a section of one end of the package shown in Fig. 3;

Figs. 5, 6, and 7 are fragmentary sections of other forms of packages embodying my invention.

Fig. 8 shows two of the protective sheets as used in one form of package;

Figs. 9, 10 and 11, are sections of other forms of packages embodying my invention.

The package includes primarily a sensitized sheet 1, a protective sheet 2, and a cover sheet 3. The sensitized sheet is of any usual or preferred form, such as a pyroxylin support coated with a photographic emulsion. The protective sheet 2 is preferably of black paper, but may be of any other material which is impervious to ordinary light rays but pervious to X-rays. It may be waterproofed in any usual manner. The cover sheet 3 is preferably of textile material and is coated with an adhesive 4 which is relatively waterproof, slow-drying and pliable and which is adherent at ordinary temperatures. Such adhesives are well known, being of the type used in surgical, adhesive tape. Typical adhesives comprise rubber and coal tar pitch with any suitable softener such as benzol, gasoline or chloroform. Sheets. 2

and 3 are of larger dimensions than sheet 1. A protective sheet 5 of black paper or equivalent material of the same size and shape as the sensitized sheet 1, is placed between the film 1 and the sheet 3. In manufacture, sheet 2 is laid upon a flat support, and the film 1 laid thereon, leaving a margin border of uniform width of the sheet 2 extending completely around it. The sheet 5 is then placed on the film 1, and in registry therewith. Cover sheet 3, which is of the same size and shape as sheet 2, is then positioned in registry therewith, and pressure applied around the edge thereof by the finger nail or any suitable tool or die, pressing the border or margin of sheet 3 which extends beyond the sheet 1 into intimate and adherent contact with sheet 2. If desired the sheet 5 may first be properly positioned on the sheet 3, to which it will adhere, and the two sheets applied as a unit to the sheets 1 and 2 lying on the support. If found necessary or desirable heat may be applied to insure a tight joint.

If desired the sheets 2' and 3' may have registering extensions or tabs 6 and 7 at one end, which are preferably uncoated on their facing surfaces. In opening the packages these are grasped by the user or by suitable clasps of a film manipulating apparatus, and the parts readily separated. Since the adhesive is of a slow-drying, permanently sticky type, the parts can be separated much more readily than if a hard-drying glue were used. This advantage exists even if the tabs are not used, in which case the user starts the separation with a finger nail or knife at one corner and strips the sheets apart. This structure showing the extension or tabs appears in Figs. 3 and 4.

If the sheet 3 is not completely opaque, the protecting sheet lying between it and the film may be made larger than the film but smaller than sheet 3 so that its edge will be bent over the edge of the film sufficiently to form a light seal. This is shown in Fig. 5, where the protective sheet is designated 5' the other elements being the same as in Fig. 2.

If desired the adhesive may be applied to the margins only of sheet 3, as shown at 4' in Figs. 6 and 7, the other elements being as in Fig. 2. In Fig. 6, there is also indicated at 8, a cord imbedded in the adhesive which may be of service in starting the opening of the package. These forms with the adhesive at the border only are in effect equivalents of the form first described since the sheet 5 covers the inner surface of sheet 3 except for the border and the two sheets together constitute a cover sheet having an adhesive at the border only.

In Figures 8 and 9, is shown a form of my invention in which the film adheres to

one of the protective sheets and is capable of being supported thereby during photographic manipulations. In this form the support 10 carries a photographic emulsion 11, and on one side thereof is a protective sheet 12, and on the other side a sheet 13 of material not injured by water, such as a linen fabric or waterproofed paper, and coated at 14 with a slow-drying adhesive composition, of the type already described. The protective sheets have extensions or tabs 16 and 17 by which they may be stripped apart. Between the film 10 and sheet 13 is a protective sheet 15 having a central aperture 18, permitting the adhesive 14 to come into contact with the back of the film. This package may be opened and the film will be carried by the cover sheet which may be supported by any suitable pin or clasp during the photographic operations. It will be more convenient to handle than the film alone which is smaller and without such a handle. In this, as in all the other figures, the thickness of the sheets is magnified, and the bending of sheet 13 appears greater than it actually is.

The form shown in Fig. 11 may be used in the same way. The support 10, having emulsion 11, is enclosed in a packet in every way resembling that shown in Fig. 4, except that the sheet 2 has adhesive at certain places thereon as indicated at 40. The emulsion side of the film faces the protective sheet 5. The sheet 2 is waterproofed to permit of its use in the baths.

In Figures 9 and 11, the emulsion surface of the film is indicated, as in those forms it must face away from the adhesive contacting films, but in the other forms it is immaterial and is not indicated. As is common in this art, double coated film may be used.

If desired both protective sheets may carry adhesive as indicated in Fig. 10, where the sheets 23, 23, have adhesive 24, 24 thereon. In this case there will be provided two inner protective sheets 25, 25 and if desired two films 21, 21 may be contained in the same packet.

I propose, moreover, to incorporate in the adhesive compound the salts of a heavy metal, in a very finely divided condition. Lead carbonate and lead oxide have been found satisfactory, having high atomic weight and density, being cheap and involving no important commercial or manufacturing disadvantages. I contemplate the use of any salt having high atomic weight and density, such for instance as mercury oxide, bismuth oxide, bismuth sulphate, barium sulphate and calcium tungstate. It is to be understood that the above list is by no means exhaustive but is merely exemplary. Commercial, practical and manufacturing reasons would affect the choice of the particular salt used. The purpose of the

salt is to avoid the effects of secondary radiation by absorption of the rays passing through the film. The salt may be present in the composition in suspension or in solution.

It is obvious that in the form shown in Fig. 10 the salts would be included in the adhesive on one side of the package only.

From the description of the various embodiments of my invention it is obvious that I have invented a package that lends itself readily to manufacture by hand or by suitable automatic machinery, which can be readily opened and manipulated for hand development or in a suitably constructed machine, provided with means for clasping and operating the tabs. The resilience of the film will tend to maintain the package flat while yielding under pressure, and the wrapping material being flexible, inelastic and inextensible will assume the shape determined by the film. The nature of the adhesive renders the package at all times easy to strip open. It does not become hard and brittle, which defects would make the package inflexible and liable to open at the joints when bent. The presence of the lead salts avoids the affects of secondary radiation without increasing the thickness of the package nor introducing the difficulties of manufacture and lack of inelasticity occasioned by the use of metal foil.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a dental X-ray package, a sheet of sensitized material, a flexible protective sheet of larger dimensions than said sensitized sheet upon one side thereof, a flexible cover sheet of material on the opposite side of the sensitized sheet and having at its margins a coating of adhesive material and also of larger dimensions than said sensitized sheet, the margins of said protective and cover sheets extending beyond the edges of the sensitized sheet and there joined by such adhesive continuously around and outside of the entire periphery of the sensitized sheet and constituting the only means for holding the package closed and light tight.

2. In a dental X-ray package, a sheet of sensitized material, flexible protective sheets upon each side thereof, the protective sheets being of larger dimensions than said sensitized sheet and extending beyond the edges thereof, the extending marginal portions having therebetween a waterproof, slow-drying adhesive whereby the margins of the protective sheets are continuously joined around and outside of the periphery of the sensitized sheet, but are adapted to be readily stripped apart and constitute the only means for holding the package closed and light tight.

3. In a dental X-ray package, a flat sheet

of sensitized material, a protective sheet upon one side thereof, a cover sheet upon the other side thereof, the protective and cover sheets being of opaque, substantially inextensible flexible material and of larger dimensions than said sensitized sheet and extending beyond the edges thereof in all directions, the extending margins of the cover sheet being coated with a slow-drying, waterproof, flexible adhesive whereby the marginal portions of the protective and cover sheets are joined in a continuous light-tight and water-tight joint around and outside of the edge of the sensitized sheet, and are capable of being readily stripped apart.

4. In a dental X-ray package, a sheet of sensitized material, protective sheets upon each side of said sheet, the marginal portions of the protective sheets having therebetween a slow-drying, flexible adhesive whereby the margins of the protective sheets are continuously joined to form a light-tight joint around the periphery of the package and uncoated tabs extending from each of said protective sheets, whereby they may be manipulated to be readily stripped apart.

5. In a dental X-ray package, a sheet of sensitized material and a thin, flexible protective covering upon each side thereof, one of the protective covers having a coating in which is incorporated the salt of a heavy metal.

6. In a dental X-ray package, a sheet of sensitized material and a thin, flexible protective covering upon each side thereof, one of the protective covers having a coating in which is incorporated the salt of a heavy metal, the protective covers having adhesive contact with each other at their edges to form a light-tight joint.

7. In a dental X-ray package, a sheet of sensitized material, and a protective covering upon each side thereof, one of the protective covers being flexible and having a coating of adhesive in which is incorporated the salt of a heavy metal, a part of said adhesive coating serving to unite the protective covers to form a light-tight joint.

8. In a dental X-ray package, a sheet of sensitized material and a flexible protective covering upon each side thereof, one of the protective covers having over the entire area thereof a coating of slow-drying, waterproof, flexible adhesive in which is incorporated the salt of a heavy metal, the protective covers having adhesive contact with each other at their marginal portions to form a light and water-tight joint around the edge of the package.

9. In a dental X-ray package, a sheet of sensitized film, a protective sheet upon one side thereof, a cover sheet on the opposite side thereof, the protective and cover sheets being flexible and of larger dimensions than

- said sensitized sheet and extending beyond the edges thereof, the cover sheet having over its entire area a coating of a waterproof, slow-drying adhesive, in which is incorporated the salt of a heavy metal, the projecting marginal portions of the protective and cover sheets being joined by said adhesive continuously around and outside of the periphery of the film.
- 10 10. In a dental X-ray package, a sheet of photographic film, protective sheets upon each side of said sheet, the edge portions of said protective sheets being joined to form a light-tight joint, each of said protective sheets having extending tabs whereby they may be stripped apart, one of said sheets being waterproof and being attached to the film by a waterproof adhesive, whereby the film will adhere thereto during photographic manipulations.
- 15 11. In a dental X-ray package, a sheet of sensitized material, protective sheets upon each side thereof, the edge portions of said protective sheets being joined by a slow-drying, flexible adhesive to form a light-tight joint, each of said protective sheets having an uncoated extending tab whereby they may be readily stripped apart, one of said sheets being of material that is not injuriously affected by water and being attached to the film by a waterproof adhesive, whereby the said sheet may be used as a means for manipulating the film during photographic operations.
- 20 12. In a dental X-ray package, a sheet of sensitized film, protective cover sheets upon the opposite sides thereof joined at their edges by a slow-drying adhesive whereby they may be readily stripped apart, one of said sheets being impervious to the effects of moisture and the sheet of film being attached thereto by an adhesive which is unaffected by the ordinary photographic baths, whereby the film will continue to adhere to the said protective sheet when the package is opened in the manner mentioned, and whereby the said cover sheet may be used in the manipulation of the film in the photographic baths.
- 25 30 35 40 45 50

Signed at Rochester, New York, this 9th day of July, 1920.

MILLARD B. HODGSON.