

# Origins and Development of Dry Mounting

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**ABSTRACT:** Early commercial development of the method of using a thermo-resin adhesive for mounting photographs is presented. The adhesives were adopted from other professions which were established well before the invention of photography (1839). Shellac-based dry mounting was patented in 1901 and the patent overturned as invalid in 1910. The term "dry mount" was originally used to distinguish between damp and wet techniques of mounting. Readers are encouraged to contribute information.

## **A HISTORY OF DRY MOUNTING, pre-1850 to 1945**

Whether for putting things together or repairing little accidents of time and misfortune, there has always been a need for adhesives. Along with the industrial age came new inventions such as photography. By the end of the nineteenth century a plethora of photographic methods and materials had been discovered.

With the advent of new binders such as albumen, gelatin, and collodion came problems of display as photographs had a tendency to curl. At first, the old, known mounting systems were used and manipulated. As with conservation, photographic practitioners borrowed and adapted methodology, technology, and materials from common existing specialties and enterprises. The early journals of photography are cluttered with the latest, newest method or adaptation of a trade technique to keep those strong, curling emulsions FLAT.

Traditional methods of adhesion included protein based (hide glue, gelatin, isinglass), sugar based (dextrin), starch based (arrowroot, wheat, corn, potato, rice), vegetable/gum based (arabic, cherry, senegal, tragacanth), and combinations of these materials. When using these adhesives extensive moisture was necessary which introduced expansion, stretching, cockling and/or curvatures in photographs or mounts. Rubber based (rubber cement, india rubber, gutta percha) adhesives offered less cockling and expansion of mounts and photographs. However, the rubber based adhesives usually contained sulfur (known to be detrimental to the photograph), were likely to discolor, were messy to work with and hard to manipulate, and often failed shortly after mounting. The tediousness and skill necessary for the various operations left neither efficiency in business nor induce-

ment for amateurs.

By the end of the nineteenth century the stage was set for an easy, reliable, repeatable, moisture-reduced, chemically safe (for photographic emulsions) adhesive method for mounting paper photographic processes. In an effort to keep moisture, that evil expander and source of curling at bay, a thin paper impregnated with a thermo-plastic resin adhesive which was activated with heat was being utilized in the mounting of photographs. The age of *dry* mounting had arrived.

The patent of a dry mount tissue, that is to say, a heat activated, non-aqueous adhesive-infused support, usually a very thin paper, was presented in France on March 18, 1901 by the "Derepas Brothers" (*La Société Derepas Frères* of Paris). The British Patent, #17,327, was taken out on August 29, 1901, passing "complete specification" by July 3, 1902. In the autumn of 1903, the Adhesive Dry Mounting Company, Limited, a British company, secured the first patent rights to sell, and later produce this product in the United Kingdom (*British Journal of Photography*, [BJP] 1903).

The British patent #17,327 was "An Improved Process for Mounting Photographs, Engravings, and the like, and Means for Carrying the same into Practice."

Our invention relates to a dry process for mounting photographs, engravings, or documents of any kind on Bristol board or cardboard.... Our process consists in interposing between the photograph or engraving and the Bristol board or cardboard for receiving it, a very thin layer of material, as hereinafter described, which is capable under the action of a hot iron or elevation of temperature combined with pressure, of uniting the surfaces with which it is in contact. For this purpose thin paper (silk paper, Japanese paper, etc.) is dipped into an aqueous or alcoholic solution of gum lac [shellac] and then dried.

Throughout 1902 and 1903 the Derepas Brothers gave numerous lectures and demonstrations of their invention.

Après de études et des expériences très approfondies depuis 5 ans, nous avons été assez heureux pour pouvoir créer un procédé, que nous nous proposons de vulgariser, .... Le mode opératoire de

ce nouveau procédé consiste à fixer l'épreuve à l'état sec, au moyen d'un adhésif pelliculaire interposé entre l'épreuve et son support, et de soumettre le tout sous une machine fournissant une action de pression et de chaleur combinées suivant la nature et le genre du papier de l'épreuve. (Société 1902).

[After five years of very thorough studies and experiences, we have had enough success to be able to create a process which we propose ourselves to popularize, .... The operative mode for this new process consists of fixing the print in its dry state, by means of a filmy adhesive interposed between the print and its support, and by subjecting the whole to a machine furnishing an action of pressure and heat combined according to the nature and type of the paper of the print. (translation Hockings 1993)]

The method and material was quickly accepted. By 1905 a recipe for a shellac mountant "excellent for dry mounting" and "The Derepas Dry Mounting Process" appeared in Mr. Paul Hasluck's *Book of Photography*, which was published and distributed across Europe and the Americas. Also in 1905, M. Briand, a French photographer, published the following recipe for "dry mount" (See the glossary):

Shellac, white or pale yellow (300 grammes), gum elemi (30 grammes), canada balsam (50 grammes), and methylated spirit 94° (1000 c. cs.). Divide the alcohol into three parts, and mix with each of the other ingredients; when they are all dissolved, mix. This should be painted on tissue paper, and allowed to dry for five minutes, and then the other side painted, and dried; paper thus prepared is placed between print and mount, and a hot iron passed over the prints will cause it to adhere well. (Briand 1905)

Two months later, another version of the recipe also attributed to M. Briand appeared in *The British Journal of Photography*, eventually becoming the standard recipe appearing in the *British Journal of Photography Almanac and Photographer's Daily Companion*, a yearly trade publication with advertisements, patents, recipes, formulas, and even obituaries.

Shellac, white or yellow, 30 g.; Methylated spirit, 50 ccs.; Dissolve and add:- Gum elemi, 3 g.; Canada balsam, 5 g.; Methylated spirit, 50 ccs. It takes about twelve hours for the shellac to dissolve; mix the two solutions, and paint both sides of a thin piece of paper and allow to dry; place the paper between the mount and the print, and pass a hot iron over the print, when it will adhere well. (BJP 1905)

Besides offering the dry mount adhesive, the Adhesive Dry Mounting Company, Limited introduced self-adhesive papers in 1907. Named "Adhero Matt Border Tints," these were colored mounts which came coated with a "resinous adhesive" (BJP 1907). "Satin Photo Mounts," "classier" boards for dry mounting were also advertised that year by Medine, Limited, in London (BJP 1907). Later, boards and albums were advertised as suitable for dry mounting (BJPA 1909).

Presses and irons were developed to accommodate the new techniques and materials. Perhaps the first commercial dry mount presses were advertised in 1904 by the Adhesive Dry Mounting Company, Limited (BJPA 1904). These machines were initially heated by burning paraffin, oil, gas, or "spirit" (alcohols) and by 1907 could be adapted for use with electricity (BJPA 1907). The style and design of these early presses varies little from our contemporary models. Early styles were made with a central screw and wheel similar to letter and book presses or clamp or lever models which were introduced in 1906 (BJP 1906). Mounting with hand held irons or using a commercial dry mounting service were other options to the purchase of this expensive machine. Advertisements for tacking irons, called "touchers" or fixing irons begin in 1906 as part of the "Adhero" Dry Mounting Machine sold by the Adhesive Dry Mounting Company, Limited (BJP 1906).

In 1907, recommended temperatures for mounting were published in *The Photographic Monthly* (née, "The Photogram"):

The Arithmetic of Dry Mounting. ....the following table of temperatures for the guidance of dry-mounters:

Carbon and gum prints	140-150°F	60-65°C
Gelatino-chlorides (lightly alumed)	160	70
Gelatino-chlorides (strongly alumed)	165-175	75-80
Colladio-chlorides	185	85
Bromide	185-195	85-90
Albumen	195	90
Platinums, plain-salted silver, "mattos" and other prints with matt faces and no gelatine	95-205	90-95

With very thick papers the temperature may be increased a little and the time be lengthened to 15-20 seconds.

Unmounting is quite easy. Heat a metal plate to 250°F or 300°F (120-150°C). Lay the print upon it, and with a piece of flannel press a corner of the print, until it is loose. Raise this corner, then press an adjacent part until it, too, becomes loose, and very quickly the whole print can be stripped without injury. (BJP 1907).

There was trouble from the beginning with the 1901 patent in England, however. The use of a water-insoluble, heat-activated adhesive was known in many fields. Hat makers had constructed hats using sheets of shellac for at least fifty years previously. Jewelers had used this material, possibly as a transparent paper for transferring

designs. Paper that had been waterproofed by brushing with or immersing into shellac, wax/paraffin, india rubber, or gutta percha, had been used for wrapping foods long before 1901 (*BJP* 1910: 178). Even some “plasters,” (called “Band-aids” in the United States), were made of “gutta-percha tissue” or rubber infused cloth on both sides of the Atlantic (e. g. Day and Shecut US patent 1845, Johnson and Seabury US commercial manufacture 1874).

Several industrious individuals and companies tried to manufacture dry-mount material only to have the Adhesive Dry Mounting Company, Limited contravene for violation of their “Sole Patent Agents” status for the Derepas dry mount material. The Kodak Company (now the Eastman Kodak Company), started manufacturing dry mount tissue with what might have been the Derepas formula in 1906 (*Kodak Trade Circular-[KTC]*). Kodak advertisements appear in journals in 1906 and 1907 (*Camera Work* and *BPJ*: cover). A 1907 dated “sample” sheet of Kodak’s Dry Mounting Tissue, which is the size of the *British Journal of Photography Almanac* (4 1/2 x 7 inches: 11.5 x 17.8 cm) was found attached to the back of a photograph (Hockings and Romer 1991). However, in 1908, Kodak became agents for the Adhesive Dry Mounting Company, Limited’s product in England (Eastman 1908). Two years later, a Kodak, Limited representative (the British office) stated that Kodak “had sold and used” dry mount tissue and “had been sued by [the Adhesive Dry Mounting Company, Limited], paid the costs and took the license” (*BPJ* 1910: 178). Continued manufacture of the material in the United States by Kodak seems not to have violated British or French patents at the time.

In 1910, the Adhesive Dry Mounting Company, Limited sued L. Trapp and Company of Milton House, Chislehurst Street, E. C., London, for just such an infringement of their sole patent rights. L. Trapp and Company sold a product called “Adherent Tissue” (the plaintiff’s was “Adhesive Tissue”) and one can easily imagine the confusion to the customer and lost revenue to the Adhesive Dry Mounting Company, Limited. A large portion of the court hearing is reprinted in the March 11, and April 1, 1910 issues of the *British Journal of Photography*. It is a humorous and fascinating insight into both the history of dry mount adhesives and tissues and British court at the turn of the century.

The court case brings to light two earlier patents with applications toward dry mount. In 1867, Jeyes patented in England, #2,604, a “waterproofing paper for the purpose of tracing or wrapping tea, tobacco, and the like by dipping [a substrate] into an alcoholic solution of shellac or other gums” (Jeyes 1867). Later, in 1894 and 1895, L. F. Dobler patented in Britain, #420, and #12,938, a process of water-proofed, adhesive infused paper for the

purpose of mounting. The procedure was to dip or brush a “pellicle” (a thin film or tissue) with gutta percha or india rubber which could be melted and activated with heat under pressure. Dobler marketed his invention as “Sweetheart Adhesive Cloth” for mounting photographic prints and thought its applications were useful for other trades and specialties such as “bookbinding for the manufacture of cardboard and millboard for backing and mounting paper” (Dobler 1895). However, it was considered expensive and never really became popular. Photographers repeatedly mention in journals of the era that the gutta percha would “ooze” out around the edges if heated too hot, ruining the photograph and the mount, and india rubber quickly became known for deleterious effects to the photographs.

The 1910 court case also brought to light the opinion that use of a “dry mount system” had been used by French photographers at least six years earlier (circa 1895) than the 1901 Derepas patent. The procedure appears to have been well known on the European continent. In fact, there are several previous patents in Great Britain, Europe, and the United States for adhesive systems requiring combinations of heat, pressure, and non-aqueous solutions, although not necessarily intended for use with photography.

It should not be surprising that in the end it was proven that “the use of shellac .... in connection with dry pressing was as old as the hills” (*BJP* 1910: 178). The Derepas patent of 1901 and the Adhesive Dry Mounting Company, Limited’s sole patent rights were overturned in the 1910 court case against L. Trapp and Company. As might be expected, there was an explosion of dry mount adhesives, tissues, mounting machines, suppliers, and advice on the scene shortly thereafter.

After being defeated in court and having to continue to defend their name in the trade circulars, the Adhesive Dry Mounting Company, Limited adopted the anagram “ADEMCO” for their product in 1915. They also referred to themselves as the “Pioneers of dry mounting” (*BJPA* 1915) bolstering their claim that they were the

“Originators of dry mount” (*BJPA* 1914). L. Trapp and Company which produced “Adherent Tissue” appear to have ceased operation in the early 1930’s.

At least two early dry mount companies (“Adherent” and “Adhesive”) printed trade marks on their product. A yellowed



dry mount tissue which has the word "ADHERENT" encased in a rectangle printed in white was found on the back of a photograph by Swaine dating from the 1930's (Lemmen 1993). The design had clear haloes all around the printing. The photograph has a *passee partout* mount. Trademarks on Ademco tissues were advertised as early as 1904. The Ademco mark was a snake wrapped around a hand mirror with the word "Marque" on the left, "Déposée" on the right (later "Trade Mark"), and "Paris" (later "London") on the bottom. The mirror reads *Adhésif conservant les Proportions or Image.*" (later "A dry mountant retaining the exact dimensions of [the] Print.") The capitol letters "D" and "F" (presumably for *Derepas Frères*, replaced with "ADMC") are on either side of the mirror above the word "Paris". English replaced French in the design by 1911. Since organic solvents are usually used to remove dry mounts, the printed marks may be lost during unmounting procedures.

Dry mounting is the mounting process of choice for photographs by photographers but has always been expensive. Advertisement of the material in trade magazines diminished during periods of economic depression or war. Manufacturers and suppliers came and went. Mounting with starch and other materials, which were less expensive and easier to obtain, gained prominence in those times.

The photographic industry standard has always been to develop materials and processes to shorten working times. Innovations in the formulations of dry mount adhesives seem to develop along with photographic materials. Descriptions of dry mount papers and adhesives in the literature from the early part of the century suggests waxes, rubbers, shellac, and early synthetics were being combined in an attempt to make adhesives with more desirable properties.

"In August 1934 Kodak introduced an improved [Type-I tissue] with better adhesion and requiring less heat" (Wilhelm 1993). Kodak continued to make Type-I shellac-based dry mount tissue until February 1974 when it introduced Type-II, which is a synthetic adhesive (KTC 1957, 1974).

Seal, Incorporated "was founded in 1936" (Seal 1990) in Shelton, Connecticut. Two products, "Foto-Flat" and "Chartex" (cloth backing), were introduced in 1938. The June 1938 issue of *Camera Craft* carried an announcement for Foto-Flat.

Foto-Flat. A New Dry Mounting Method. Foto-Flat is an entirely new, scientifically developed membrane .... It is permanent or may be removed when desired by reversing the mounting process. It is absolutely impervious to moisture and unaffected by climatic temperature changes. (*Camera Craft* 1938)

Fotoflat® is currently a synthetic. Seal Products, Incorporated, is now one of the largest manufacturers of dry mount tissue in the United States. They currently manufacture ArchivalMount™ (1984), ColorMount® (1973), FotoFlat®, Fusion® 4000 (1976), MT5® (1953), and MultiMount™ (1989) among other products. A Kodak Chemical Plant employee, Mr. Wentworth C. Eaton, cited dry mounts as being comprised of rubber-wax (cohesive tissues) or shellac (thermo-plastic resin) in 1941. "A new, lower-temperature (150° F [65° C]) mounting tissue using a wax adhesive, Kodak Thermount Tissue" (Eaton 1941) was introduced in that year (KTC 1941). This material may have been developed not only to accomplish faster mounting procedures but to accommodate Kodak Resisto and Resisto Rapid papers. These waterproofed papers were developed during the 1930's and 1940's and used by the United States Armed Forces. They were "coated with baryta, then overcoated with a cellulose ester in a solvent" (Eastman Kodak 1985). Kodak discontinued manufacturing Thermount tissue in 1957.

These faster processing waterproofed print papers might have melted at the higher temperatures (175-210° F [80-100° C]) required for mounting with shellac-based dry mount tissues. Photographers and conservators alike have proposed that synthetic dry mount tissues were introduced along with Resin Coated (RC) papers (late 1960's to early 1970's) for this reason. Kodak Resisto and Resisto Rapid papers have been described as the earliest waterproofed papers and precursors of resin coated paper (Eastman Kodak 1985).

#### EVOLUTION OF "Dry mount" TERMINOLOGY

If the source of dry mount technology cannot be traced to a single patent or inventor, neither can the term "dry mount" be attributed to any particular individual. The Derepas patent focused attention on this particular technique at a time when photographers were receptive to it. However, the 1901 patent never specifically named the material a "dry mount" or "dry mount tissue" although that is the term by which it became universally known.

There seems to have always been confusion over the spelling and meaning of "dry mount" versus "dry-mount" versus "drymount" or "drimount." The term has been used to indicate mounting with reduced moisture, mounting while materials are in a dry, non-aqueous state, mounting with a non-aqueous adhesive, mounting techniques with heat or to denote a product sold for any mounting purpose described previously.

The term dry mounting often appears in early photographic and arts journals as a way of describing a mounting technique in which the print was damp, but not soaking wet. Adhesive (such as gelatin, paste, dextrin, etc.) was brushed onto the reverse of the picture and allowed

to dry. Just before mounting, the mount was dampened. The adhesive swelled upon contact with moisture and became tacky without expanding the print or mount significantly. The print and mount were immediately aligned and put under heavy pressure, such as being passed between two rollers of a press. Pressure achieved adhesion. This “anti-wet” or “dry mount” technique was often referred to as “Cowan’s method” after Mr. Alexander Cowan who popularized its use in England during the 1880’s and 1890’s. It was also associated with Messrs. Robinson and Thompson (*BJP* 1884), M. E. Renard (*BJP* 1896), and Mr. G. Watmough Webster (*BJP* 1897) among others. Numerous variations of this method, such as applying adhesive to the mount or to both mount and print, were developed for various types of photographs.

In 1882, Mr. Henry Baden Pritchard described a mounting method which he attributed to Mr. W. Harvey Barton that used hot, pale Russian glue with a wet photograph, which “is the reverse of dry mounting” (Pritchard 1882). In 1897, Professor Delepine of Owens College, Manchester, England patented a “dry mounting” technique which involved the use of swelled gelatin (*BJP* 1897).

In 1904 G. Watmough Webster reminisced that the French photographer, M. André Adolphe Eugéne Disdéri (Court photographer to Napoleon III and inventor of the *Carte-de-Visite*), had been “perhaps, the first in this country [England] to use the process of dry mounting.” Mr. Webster claimed he witnessed “tens of thousands of prints at the place [Disdéri] then had at Brompton, all ready [sic] coated with gum at the back waiting to be mounted. That must have been nearly forty years ago,” suggesting circa 1856. He went on to say “there was a great demand for cartes of the Empress Eugénie [1853-71]” and at the time neither “bromide [1873], nor ‘gaslight’ papers” [Velox/1893] had been invented (*BJP* 1904: 509). Mr. Webster was a prolific contributor to the *British Journal of Photography* and one wonders why he had not mentioned this “dry mount” procedure before 1904. There are numerous “gums” (arabic, benzoin also known as benjamin, cherry, elemi, lac, senegal, and tragacanth also known as gum dragon) which M. Disdéri could have used as a mountant.

Another confusion is the interchange of the terms “dry mounting” and “laminating”. The definition of laminate is “to make by uniting several layers” and “to cover with thin sheets” (*American Heritage Dictionary* [AHD] 1976: 734). By the first definition, a dry mount is a lamina. By the second definition, it is not. Conservation professionals in the United States use the terms “laminate” and “dry mount” to differentiate between two distinct processes. Lamination is a method using heat and pressure to attach thin plastic films to

both sides of a paper. Dry mounting is a method using an adhesive inserted between paper and support (usually a board) which is activated under heat and pressure. Early medical tapes, dry mount, and laminate adhesives all have similar origins as the early adhesives were the same. By 1890, liquid cellulose nitrate was being used as a protective layer on paper, like a varnish or laminate might function (Stiber 1988: 28). However, two-sided lamination with thermo-resin materials activated under heat and pressure does not occur until the late 1920’s and early 1930’s, when the commercial manufacture of cellulose acetate sheets was perfected (Stiber 1988: 29). Dry mount, as has been described throughout this paper, was well established by this time.

#### **FUTURE RESEARCH : THE SYNTHETIC ERA, 1945-current**

The tracking of commercial products since World War II presents difficulties. Proprietary recipes are closely guarded and perhaps frequently “improved.” Dry mount advertisements are scarce in contemporary photographic journals from about the 1930’s onward. This phenomenon only emphasizes the fact that dry mount was never exclusively a product for mounting photographs. While some synthetic products seem to have been developed specifically for the purpose of mounting photographs (e.g. ColorMount® for RC photographs. Seal 1989), others are advertised for mounting many types of materials (e.g. Fusion® 4000 for canvas, tree bark and leaves, watercolors, brass rubbings and wax drawings, parchment and sheepskin, and thin fabrics such as silk. Seal 1985).

To complicate matters, companies buy each other and continue to manufacture competing products. “Seal acquired Ademco Drimount Ltd. in England in 1987 and in 1990 the combined firms were purchased by Hunt Manufacturing Company headquartered in Philadelphia, Pennsylvania.” (Wilhelm 1993). Hunt Manufacturing Company (Statesville, NC) produced its own product line called TechMount™ 1, 2, 3, and 4 (Hunt 1988). In 1992, “Single-Step™ a pre-coated .... heat activated [Seal adhesive] [Bienfang®] Foam Board” was marketed for use “with posters, smooth paper artwork, photographs, newsprint and a variety of fabrics.” (Hunt 1992).

Dry mount has been used on photographs, books, papers, textiles, and paintings in conservation treatments, also. Therefore, questions remain and the research continues. Those readers who may have information which would elaborate on this area or those who have tested adhesives are encouraged to contact the author. All contributions will be gratefully accepted and acknowledged.

“There are a great many things I am in doubt about at the moment, and I should consider myself favoured if you would kindly enlighten me. Signed, Doubtful, off to

Canada." (*BJP* 1914).

## BRIEF GLOSSARY

*Canadian balsam*: "A viscous, yellowish, transparent resin obtained from the balsam fir (an evergreen tree, *Abies balsamea*) and used as a mounting cement for microscopic specimens." (*AHD* 1976: 194).

*gum elemi*: "Any of the various oily resins derived from certain tropical trees, especially *Canarium luzonicum* of the Philippines, used in making various varnishes and inks. From the Spanish and Arabic "elemi." (*AHD* 1976: 423).

*gum lac*: see shellac

*gutta percha* (also gutta-percha): "a plastic rubbery substance derived from the latex (of the tropical trees genera *Palaquium* and *Payena*) used as electrical insulation and for waterproofing." (*AHD* 1976: 588).

*india rubber* (also indiarubber, rubber, or caoutchouc): a light cream to dark amber amorphous elastic, solid polymer of isoprene (C<sub>5</sub>H<sub>8</sub>)<sub>n</sub> generally prepared by coagulation and drying of the milky sap, or latex of various tropical plants, especially the rubber tree, (*Hevea brasiliensis*), and subsequently vulcanized, pigmented, and otherwise modified...." (*AHD* 1976: 1132)

*shellac*: (also shellack, shell-lac, gum lac): "resinous secretion of the lac insect (*Tacchardia lacca*)." Primary sources are India and Indo-china (Myanmar [Burma], Thailand, Cambodia, Laos, North and South Vietnam and the Malay Peninsula). (Gettens and Stout 1942: 31, 61).

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