

# The Folding Kodaks - 1890-1897

By Jos Erdkamp



Left to right: No. 4 Folding Kodak, 1890/1891 model ; No. 5 Folding Kodak, 1892 model ; No. 6 Folding Kodak.

In this article I present the Folding Kodaks of the period 1890-1897, with special attention to the relationship between construction and technical possibilities on the one hand and the intended users on the other. What did the Folding Kodaks look like, who used them, how did they develop and why did the series end?

On 24 December 1889, the Eastman Company filed a patent application for a special camera design. Inventor Frank Brownell reveals the essence of the innovation: 'My current invention aims to provide a camera that can be folded into a small compass and expanded to take a fairly large picture; and it further has the object of providing said cameras with means for using roll holders for flexible film, thereby providing a relatively small detective camera that is not only capable of taking large photos but also contains sufficient material for a large number of them, these being the objects most sought after in articles of this description.' (U.S. Pat. No. 442216, patented Dec. 9, 1890)

The key words here are: *compact, transportable, hand camera and film*. In 1889 these were not self-evident because the usual equipment of the (amateur) photographer consisted of a glass plate camera, a case containing plate holders and a tripod. However, this situation was not static and various visionary camera builders were working hard to change things.

In June or July 1888 George Eastman introduced the revolutionary Kodak box camera to the world, followed at the end of 1889 by the larger No. 2, 3 and 4 boxes. It was Eastman's first series of successful cameras. Simplicity was their most important characteristic and selling point. They were intended for leisure photographers who did not want to bother about the technical aspects of photography, but who were interested in capturing the pleasant moments of their private lives, such as family trips, long journeys abroad or entertaining friends at home. The results did not have to be perfect, as long as the objects were recognizable. This was a new class of amateur photographers and - because of its size - a target group with enormous commercial potential. I call them 'family' photographers. They distinguished themselves from the amateur photographers who mainly strived to produce technically and artistically perfect works of art. In general, the latter took

their hobby very seriously, often read the special photo magazines and were members of a photo club. I call them 'ambitious' photographers. As usual, all kinds of intermediate forms will have existed in reality.

At Eastman, the success of the first Kodak and the concept of trouble-free photography whetted the appetite. On 8 July 1889, one year after the introduction of the Kodak and even before the larger box cameras appeared, the company ordered fifty copies of a new type of camera from their factory. The device was almost as easy to operate as the Kodak box, but a lot smaller when closed by using a retractable bellows. This was the first batch of No. 5 Folding Kodaks. With this, Eastman was once again focusing on the growing group of family photographers. Many took their cameras with them on trips and outings. Sometimes this was combined with another craze: cycling. For photography in a studio it was not so important whether or not a camera was portable, but compactness was a must when it taken into the fields and on the roads. Safety of the vulnerable device and ease of use were also of importance. For the new target group that Eastman is focusing on, photography must be fun and not a burden. The Folding Kodak that Brownell describes in the patent cited above responds completely to this.

## The overview

The Folding Kodaks were available in three sizes:

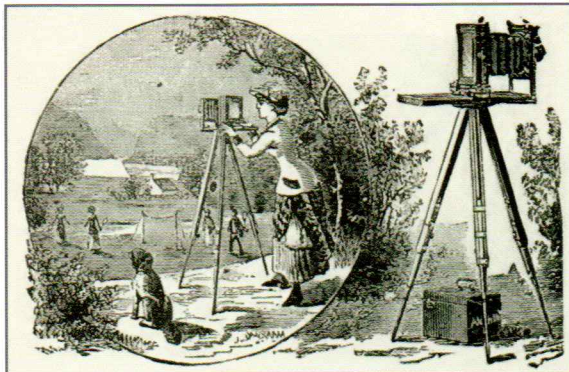
- No. 4 for 4x5 inch photos, 1890-1897
- No. 5 for 5x7 inch photos, 1890-1897
- No. 6 for 6.5x8.5 inch photos, 1893-1896

The construction is the same for all three and consists of a box-shaped leather case with hinged lid on top and hinged front panel. With traditional bellows cameras of that era, the vulnerable parts such as lens, bellows and ground glass must be protected during transport by storing the device in a case. With the Folding Kodaks there is actually no longer a separate case but the outside of the closed camera takes over this function. All vulnerable parts are safely stored in it. The lens and shutter do not have to be disassembled for transport, as is often required with traditional plate cameras before they can be stored in their cases.

continues over



## The Folding Kodaks (continued)



*Typical amateur camera outfit at the end of the 1880's, consisting of case (for camera and plate-holders), camera and tripod. In: Photography in the studio and in the field, by E.M. Estabrooke.*

The first Folding Kodak models from 1890 and 1891 used rollfilm and not glass plates. From 1892 the cameras could handle glass plates as well. The film holder or the glass plate holders were accessible via the hinged lid that forms the top of the camera. The front panel of the device can be folded down at an angle of ninety degrees and is then held in position by two struts. The lens board is pulled forward over a rail on this drop bed. A metal arrow on the lens board indicates the set distance on a scale on the drop bed. The cameras are hand held or mounted on a tripod.

The dimensions of the devices vary over the years. The smallest version of the No. 4 measures 5.8x6.1x7.5 inches, while the dimensions of the No. 6 are 8.5x10.8x11.9 inches.

The Folding Kodaks cameras were not for everyone, although this was not so much a matter of complexity but had much to do with the price. The hobby photographer needed to be sufficiently affluent, because a Folding Kodak was not cheap to purchase and use:

No. 4: between £ 10.38 and £ 12.60

No. 5: between £ 12.38 and £ 14.50

No. 6: £ 22.50

Stereoscopic lens and shutter for No. 5 and No. 6: \$ 14 plus \$ 18.50, or £ 7.00

Spool of 54 exposures for No. 5: \$ 6 or £ 1.30

Spool of 48 exposures for No. 6: \$ 8 or £ 1.65

To give an idea of the value, I have listed a few annual incomes from around 1890:

USA Blacksmith: \$ 570 : USA Painter: \$ 450

USA Public school teacher: \$ 256

UK Bank clerk: £ 50 to £ 100

UK Head gardener of a large estate: £ 120

UK Butler of a large manor: £ 40 to 60

UK Bricklayer: £ 100 : UK average factory worker: £ 55

For a large part of the working population, therefore, the purchase price of a Folding Kodak was equal to one or more months' income. It should also be borne in mind that in most households the salary that remained after payment of necessary expenditures such as rent, food, clothing, heating, health and transport, was much lower than today.

The design of the Folding Kodaks changed considerably during the seven years of their existence and distinctions can be made between:

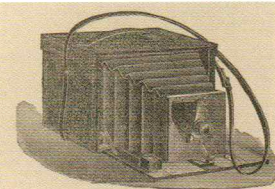
The first 1890 and 1891 models for film spools

The transition model of 1892 for films and glass plates

The improved models from 1893 with extensive options



**Early No. 4 Folding Kodak with roll holder.**  
Pre-1892 models were for rollfilm only. The roll holder has no dark slide and the camera cannot take a plate holder or ground glass. The camera hasn't got a door in the back because there is no ground glass to look at.



THE NO. 4 KODAK.

This is an entirely new style of Kodak, embodying the Kodak principle but folding up into about two-thirds the space. It is self-contained when closed, and can be opened and closed in two motions. It is the most compact and simple folding camera ever made, and can be used either for tripod or detective work.

Size of picture, 4 x 5 inches.

Rectilinear lens, special self-capping shutter, rotating wiper, adjustable speed, reversible finder, 2 sockets for tripod, screw and graduated focusing index.

The camera forms its own carrying case—See cut above.

Capacity, 48 exposures without the necessity of re-loading.

Size of Camera (folded), 7 x 5 x 3 1/2 inches—190 cubic inches.

Weight loaded, 3 pounds 10 ounces.

Price, including Shoulder-Strap and Instruction Book, loaded for 48 exposures .....

£10 7 6

5s. 6d.

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

10s. 7 6

**Details of an 1891 ad in:**  
**J.F. Shew & Co. :**  
**inventors, manufacturers**  
**and patentees of specialties**  
**in photographic apparatus**  
**and dealers in every**  
**description of photographic**  
**materials and apparatus**

### The first models

In the Kodak catalogue of 1889, the No. 4 and No. 5 were announced with an issue date of around 1 January and 1 February 1890, respectively. However, according to the Eastman Kodak Production Order Book, the first delivery took place on 10 July 1890. That would mean that the first Folding Kodaks were not available until the summer of 1890. (The Production Order Book contains the numbers of cameras that Eastman Kodak has ordered from their camera factory on a specific date. The overview was compiled around 1921 based on data in the old Kodak company archive.)

The devices were advertised as the most compact and simple foldable cameras ever made. 'This is an entirely new style of Kodak embodying the Kodak principle but folding up into about 2/3 the space. It is self-contained when closed, and can be opened and focused in two motions. It is the most compact and simple folding camera ever made and can be used either for tripod or detective work.' (Description of No. 4 in Kodak catalog 1889)

Eastman Kodak associated tripod work with better photos: 'It is obvious that for the finest work, where a tripod is to be largely used, the Folding Kodaks are best', claimed the Kodak catalog of 1894. Detective photography means taking pictures with a hand held camera. At that time the hand camera was so unusual that hardly anyone noticed that a photographer was walking around, so he or she could photograph unnoticed.

The volume of the No. 4 Folding Kodak is indeed only two-thirds of the No. 4 Kodak box camera, which also





**No. 5 Folding Kodak, model of 1892 with Asbury Barker shutter.** This specimen was owned by princess Maria Theresa von Braganza, Infanta of Portugal, (1855-1944). She became by marriage an Archduchess of Austria and stepmother of Franz Ferdinand von Österreich-Este, who was assassinated in Sarajevo on June 28th 1914.

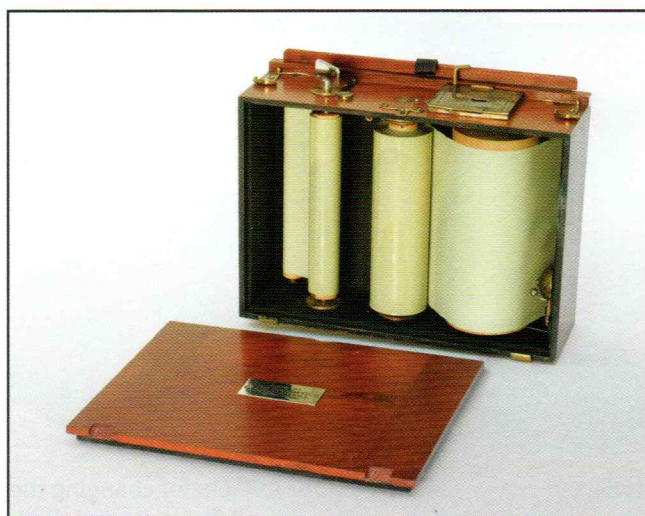
makes 4x5 inch photos, because the No. 4 Kodak box has a volume of 406 cubic inches and the No. 4 Folding Kodak of 265 cubic inches. These figures are based on the actual dimensions of the cameras and not on the dimensions mentioned in the catalog.

So the No. 4 and 5 Folding Kodaks are indeed more compact and easy to transport, but are they also easy to use? Around 1890, this means that fewer actions are required compared to traditional bellows cameras with glass plates and that fewer settings have to be chosen.

With the Kodak box camera of 1888, photography has become a whole lot easier and requires only a few actions: pull the cord to tension the shutter, point the device at the subject, press the button to take the photo and turn the key to wind the film. With the larger picture formats of the No. 3 and 4 Kodak it is not possible to apply fixed focus lenses, so with these the distance must be set on a scale. The mode of operation is similar for Folding Kodaks. As an additional action, the photographer must open the camera and pull the lens board out over the rail until the pointer indicates the correct distance.

Let's have a look at the different parts to see how simple they are to use.

The shutter is the same as that of the Kodak box cameras from the same period (US patent 440137, November 11, 1890). It is a sector shutter that must be tensioned for each shot by pressing down a part of the shutter plate. During this operation, the opening in the shutter plate passes the lens, but this opening is automatically covered by a brass plate, so that no light can penetrate into the camera. The shutter speed is difficult to determine, but a time of approximately 1/50 of a second is mentioned for the Kodak box. The spring tension can be changed to adjust the shutter speed, but according to the manual this is not recommended unless you have a lot of experience. Furthermore, the shutter can be opened for time exposures, whereby the lens cap must be used to control the exposure.



**Roll holder of the No. 5 Folding Kodak, 1892 model.** The circumference of the large diameter roll on the right is the same as the width of one photo. After one rotation of the roll enough film is wound on for a new exposure.

A semicircular metal disk contains four aperture openings. The manual explicitly states that the largest aperture (approximately f/11) must be used for "normal" shots, that is, snapshots when there is sufficient sunshine. The ratio between the openings is 1: 1/2: 1/5: 1/10. The second opening is for exceptionally bright sun (beach, tropics) or time exposures. The third and fourth openings are never for snapshots, but for indoor and outdoor time exposures with clouded weather.

The lens is a Bausch & Lomb Universal with a focal length of 6.5 inches with the No. 4 and 7.125 inch with the No. 5. The picture sizes are too large for fixed focus lenses, so it is necessary to choose the correct distance setting. This is done by moving the lens board forwards or backwards and reading the set distance with the help of the pointer and distance scale. The subdivisions on the scales of various cameras differ, but with an early No. 4 there is a choice between 5, 6, 8, 10, 12, 15, 20, 25, 50 and 100 feet. This range of distances may seem excessive, but it is not because the depth of field in the close range is limited. Take for example the No. 4 Folding Kodak. With a largest aperture of about f/11, which in practice almost always had to be used, the depth of field at 5 feet is only 0.57 feet (assuming a circle of confusion of 0.1 mm). With a setting at 10 feet, the depth is 2.47 feet. The manual indicates that 25 feet is a common "street work" setting. The depth of field is then 17 feet.

The camera is aimed at the object with the help of a small reflex finder. This gives something of an idea of what is being photographed, but no more than that. The first Folding Kodaks are pure film cameras and therefore do not have a ground glass for focusing and composition of the image.

After tensioning the shutter, setting the distance and aiming the device, the photographer is ready to take the photo. This is done by pressing a lever on the shutter. To complete the cycle, the film must still be transported. The lid gives access to the roll holder in the device. This holder is a variant of the Eastman-Walker roll holder from

continues over



## The Folding Kodaks (continued)



*Bell inside the 1892 No. 5 Folding Kodak roll holder. After one rotation of the measuring roll, the bell strikes to indicate that enough film is wound on.*

1884 and can be taken out of the camera for changing the film roll. They are not yet daylight roll film reels and the change must be done in a dark room. Because these are not present on every street corner, the film strips of the first Kodaks are long enough for a large number of photos and one does not have to replace a film frequently. The spool of the No. 4 is for 48 shots and that of the No. 5 for 54 photos. Incidentally, the No. 5 sold with a film for 32 shots, but the longer ones were available separately.

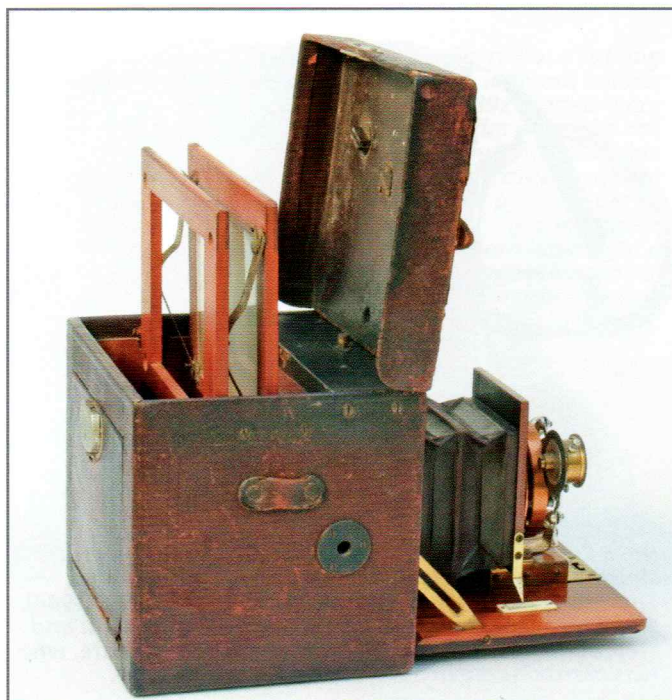
Judging from a very early example of the No. 4 in my collection (serial number 77), initially there was no winding wheel or key on top of the camera, but the lid must be opened and the key on the film holder must be turned. Very soon a wheel was attached to the lid, which is connected to the film holder. Even the images in the 1889 catalog and the patent already show such a wheel. From around 1893 the wheel or key on top of the lid is canceled again.

When winding the film, the photographer must know two things: 1. When enough film has been wound for the next shot. 2. How many photos already have been made or can still be made. The first question is answered with the help of a measuring roll in the film holder. The circumference of the roll is equal to the width of a picture. The film revolves around the roll during winding. There is a mark on the outside of the holder on the axis of the measuring roll. If the measuring roll, and therefore also the mark, has made one rotation, sufficient film has been wound. At the same time a sharp click indicates also that enough film has been wound.

The roll holder initially doesn't have an exposure counter. The photographer is supposed to make a note in a booklet after each photo. In 1892 all Kodaks were fitted with an exposure counting mechanism.

Constant improvements have been made to the construction of the roll holders, so that all kinds of variants can be found. In a No. 5 from 1892 in my collection, for example, the click mechanism has been replaced by a hammer that hits a tiny bell.

The first versions of the No. 4 and 5 Folding Kodak are clearly intended as easy-to-operate devices. That is how they are advertised. The philosophy behind it is the same as that of the first generation of Kodak box cameras: make photography as simple as possible, so that non-technically interested people can also take pictures. The cameras are constructed for films and not for glass plates.



*No. 4 Folding Kodak with plate adapter consisting of two frames connected by flat springs. The frame closest to the lens has a ground glass. The other frame slides in grooves. To insert a plate holder the ground glass frame is pushed towards the back. The springs on the frame hold the plate holder firmly in its place. The plate adapter can be taken out when a roll holder is used.*

*The plate adapters, including three double plate holders and a leather case, could be bought separately for £ 1.65 (No. 4) and £ 1.98 (No. 5), according to an advert in Photography annual, by Henry Sturme, 1892.*

Films are light, unbreakable and easy to use. Dozens of photos can be taken without having to reload the cameras. It is also not necessary to change plates between exposures. There is no ground glass to focus on, no shift or tilting of the lens board and film holder is possible. The operation of the camera has been kept as simple as possible. Only the distance must be set correctly and otherwise the photographer should preferably not change anything. The shutter is set at a speed that is fast enough for 'detective' photography and the largest aperture is suitable for all ordinary snapshot work. The only condition is that the sun shines brightly and the objects are well lit.

### The 1892 models

A change of policy was started in 1892. Eastman Kodak was still convinced that film photography is the future, but because they could not convert the whole world in one day to use film on a roll, the company decided to make the cameras suitable for glass plates. The No. 4 and No. 5 Folding Kodaks came standard with a roll holder, but now this could be replaced by a special glass plate attachment. With this inserted there was still room for the storage of three double plate holders in the back of the camera. Older models could be altered to take the glass plate attachment. The use of glass plates also means that a door was made in the rear panel, so that the photographer could see the image on the ground glass.

The old roll holders had no dark slide in front of the film surface to close the holder light-tight. Apparently it was assumed that nobody wanted to change the film outside of the dark room. Now that both roll holders and glass



## COLUMBUS KODAKS.

The latest model Folding Kodaks having all the advantages and improvements of the highest class view camera, combined with the compactness of the Kodak.

The Lens covers the plate fully, even when the front is raised. It is instantly removable, and can be replaced by a wide angle lens which fits the same shutter.

The Folding Kodaks are now fitted with no iris diaphragm shutter, worked either by hand or by pneumatic tube which has a range of automatic exposures from  $\frac{1}{2}$  of a second to 3 seconds.

A double swing back, sliding front, and falling frontboard are among the improvements. These Kodaks can be focussed with the index, or on ground glass; and, in the case of the No. 5 and No. 6 Kodaks, the long or short focus lens can be removed, and a stereoscopic lens and shutter attached in its place.

No. 4 (for 4 x 5 pictures) For Film & Glass.  
No. 5 ( " 3 x 7 " ) " " 14 10 0  
No. 6 ( " 2 1/2 x 3 1/2 " ) " " 22 1 0

THE EASTMAN PHOTOGRAPHIC  
MATERIALS CO. LTD., LONDON, W.  
115-117, OXFORD ST., LONDON, W.  
France: 14 Place Vendôme, Paris.  
Place Grimaldi, Nice.  
Rochester, N.Y., U.S.A.,  
Eastman Kodak Co.  
SEND FOR ILLUSTRATED CATALOGUE.

**No. 5 Folding Kodak, model of 1893.**  
**The lens board is raised to its highest position. The bellows does not move with the rising board and the total rise is rather limited.**  
**The rack and pinion for fine focussing is introduced in 1894.**

**Ad in Westminster Budget of September 29, 1893.**  
**The text emphasizes the versatility of the instruments.**

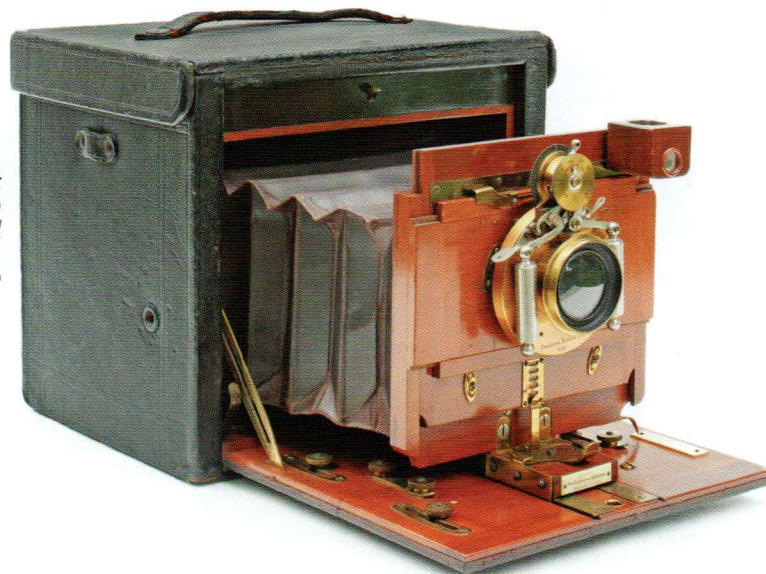


plate holders could be used, it was much more conceivable that people might want to switch between film and glass plates along the way. To facilitate this, the new roll holders were fitted with a dark slide as standard. Old roll holders could be modified. The total costs for altering the older cameras varied between \$10 and \$15, depending on different options. I have not been able to find the UK prices.

For those who did not want to buy a camera with roll holder, there were the No. 4 and No. 5 Glass Plate Folding Kodaks. Roll holders, excluding film, can be purchased extra for \$ 10 and \$ 12.50 respectively.

Many photographers, and in particular the more ambitious ones, still preferred glass plates at that time, because these have some advantages:

They stay flat and cannot warp in the camera.

They do not curl or bulge during development or when they are dry.

Easier to develop individually, so that one can take into account the circumstances during the exposure and the nature of the object. With films, the individual exposures can be cut into separate negatives, but this is cumbersome.

(For this, during the winding of the film in the Kodak camera, a bump or hole is punctured in the film strip between two shots, so the photographer can feel where to cut).

The possibility to work with various types of glass plates, so that one can choose the most suitable one for a photo. Emulsions on glass plates are more sensitive to light than what is possible with celluloid (at the time).

Lower price than films.

With glass plate cameras, a ground glass can be used, allowing the photographer to better assess the image and composition, adjust the sharpness more accurately and view the effect of the shift of the lens board and tilt of the plate holder.

A second important change in 1892 is the replacement of the sector shutter by an Asbury Barker shutter with times of 1/100, 1/50, 1/5, 1, 2, 3, 4, 5 seconds, T and O. A wheel contains four aperture openings.

It is worth noting that the No. 5 now has a rising front, so that higher buildings can be photographed without tilting the camera up. The latter is out of the question because of the undesired perspective distortion. Also, by sliding the lens panel a little up, one can eliminate a large but uninteresting foreground. The ground glass is indispensable to assess the result. More on this later.

The new models from 1892 already met some of the needs of the ambitious amateur, who had higher demands on his camera and his photos than the family photographer. The most important change was the possibility to photograph on glass plates, with all the associated advantages. Finally, with its range of shutter speeds, the Asbury-Barker shutter made it possible to shoot under various lighting conditions. In theory, this was also possible with the sector shutter, but it was much more inaccurate and cumbersome.

The prices of the Folding Kodaks were higher due to the alterations, which according to the Kodak catalog had to do with the costs of the Asbury Barker shutter. The No. 4 and No. 4 Glass Plate cost \$ 55 and the No. 5 and No 5 Glass Plate \$ 65. The English prices in 1892 were £ 11.38 and £ 13.38 respectively.

### The improved models from 1893 onwards

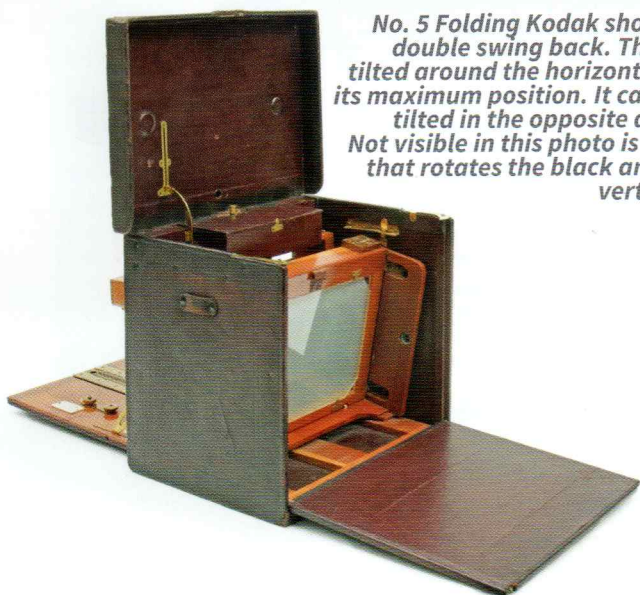
In 1893 not only the No. 6 Folding Kodak was introduced, but the design of the cameras was also thoroughly updated. The devices now offered ample opportunities for the ambitious photographer. The catalogues and advertisements leave no room for misunderstanding: '... the artistic instinct may be employed to its fullest capacity in the photographic work, especially with the Folding Kodaks which are equipped with every device that can in any way assist the photographer in making a perfect and artistic picture.' 'They have every feature which the most advanced amateur's desire, and combine all the advantages of a complete view camera with the compactness of a Kodak.' 'In the quality of the work they will do ; in their adaptability to any thing and every thing photographic [...] the Folding Kodaks stand alone. They know no competition.' The slogan 'the most compact and simple folding camera ever made' belonged to the past. So let's have a look at what has changed.

The unreliable Asbury Barker shutter has been replaced by a Bausch & Lomb Iris Diaphragm shutter with speeds of 1/100, 1/50, 1/25, 1/5, 1/2, 1, 2 and 3 seconds, B and T. The aperture range goes from f/8 to f/50 or sometimes f/64. Also new is the option to use a wide-angle lens. The No. 5 and 6 can also be equipped with stereo lenses and shutter. When using wide angle and stereo lenses, the lens board is extended less far, so that the front part of the

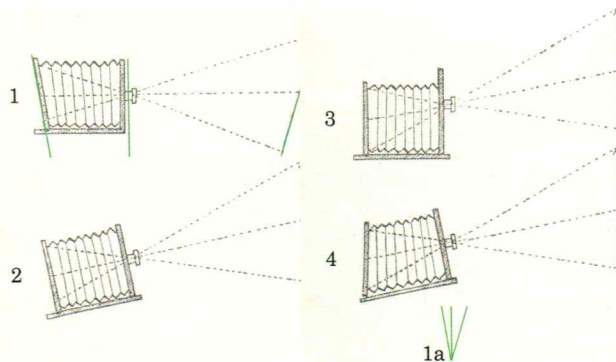
continues over



## The Folding Kodaks (continued)



**No. 5 Folding Kodak showing the double swing back. The back is tilted around the horizontal axis to its maximum position. It can also be tilted in the opposite direction. Not visible in this photo is the lever that rotates the back around the vertical axis.**



**Illustration based on Dr. E. Vogel's *Taschenbuch der Photographie*, 1913, and adapted by the author.**  
**1: When the back of the camera is tilted, the plane of sharp focus also tilts. The imaginary planes through the back, the lens board and the zone of focus meet together on one line (1a).**  
**2: Tilting the entire camera is not done because it results in a distorted perspective in the photo.**  
**3: The rising lens board enables the photographer to photograph higher objects without distortion.**  
**4: If the rising of the lens board is not sufficient, the camera may be tilted, but the back has to be swung into a vertical position to avoid distortion.**

drop bed may be visible in the picture. To prevent this, the drop bed has an extra hinge in the middle, so that the front part of the bed can be folded down. The cameras are also equipped with a rack and pinion knob for precise focus. This is especially useful when the photographer is focusing on the ground glass with his head under the black cloth and at the same time has to move the lens forwards or backwards.

The lens board of all three cameras can now slide vertically and horizontally and the film or plate holder can be tilted around the vertical and horizontal axis. These options enable the photographer to change the perspective and the depth of field zone.

In the older instructional books for the amateur photographer, it is always stressed that the glass plate or film must be held vertically to avoid ugly perspective effects, such as buildings that seem to fall backwards. With the vertically sliding lens panel it is possible to hold the camera level (plate or film holder vertically) while photographing tall buildings. If the maximum shift of the lens panel is not yet sufficient for a tall building, the entire camera can additionally be directed slightly upwards. In that case, the film or plate is no longer in the vertical position. By then tilting the plate or film holder, the vertical position is restored. Tilting has a second function, namely shifting the zone of focus. This can be applied in portrait photography but also with landscapes and still lifes. Parts of the object to be photographed are located at different distances from the camera and would not all be sharp in the picture if the depth of field is insufficient. For example, with a seated person, the feet are closer to the camera than the head. By tilting the film plane around the horizontal axis, the area that is in focus also tilts. This way both head and feet can be photographed while in focus.

The improved Folding Kodaks from 1893 have a lens board that can be shifted vertically and horizontally and a plate holder that can rotate around the horizontal and vertical axis. This has two advantages. Firstly, the camera can be turned on its side for vertically oriented shots, while all desired perspective settings remain possible. Secondly, the settings can also be applied when shooting, for example, wide buildings or scenes that require a horizontally adjusted sharpness zone.

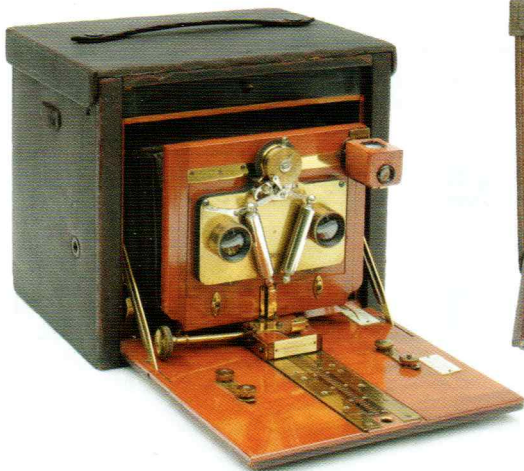
Due to the use of stereo lenses and the horizontal shift of the lens, the lens panel of the Folding Kodaks has been made wider. The adjustment mechanism also affects the dimensions of the cameras. Until 1892 the No. 4 had a capacity of 265 cubic inch, but by 1894 it was increased to 385 cubic inch. The No. 5 increased from 473 to 692 cubic inch.

The No. 6 Folding Kodak has the same options as the No. 5 and produces 6.5 x 8.5 inch negatives on film or glass plate. The device measures 8.5 x 10.8 x 11.9 inches and the volume is 1092 cubic inch. It's a big and bulky machine and I can't imagine any family photographer taking it with her on a biking trip on a Sunday afternoon.

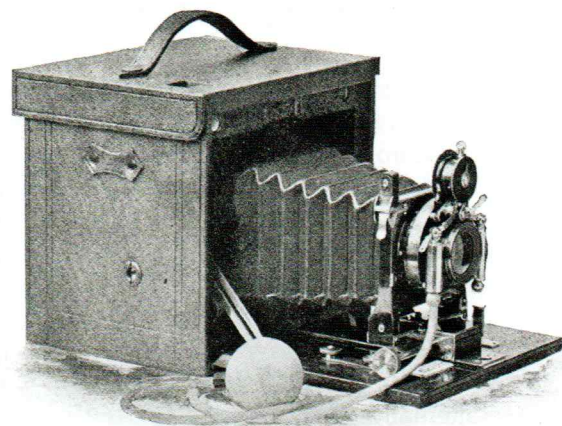
Eastman already ordered two No. 6 cameras from the Brownell camera factory on 4 January 1890. Then it took until 1893 when on 7 March, 2 August and 22 November three batches of 50 cameras each were ordered from the factory. According to a comment in the Production Order Book, the first delivery of the No. 6 took place on 1 July 1895. It is not clear whether this concerned the delivery of the factory to Eastman Kodak or the delivery of Eastman Kodak to the dealers. Anyway, a first delivery in 1895 is remarkable because the No. 6 has already been mentioned in the British Kodak catalog of 1893, in the US Kodak catalog of 1894 and in advertisements from 1893 and 1894. Were there no orders received at Eastman Kodak for the No. 6 and therefore no delivery took place until July 1895? Or were the first 50 cameras delivered on 1 July 1893, and was the '3' in the old handwritten original file mistakenly read as a '5' when the Production Order Book was compiled in 1921?

In 1895 the No. 6 was mentioned for the last time in the Kodak catalog. According to a chronology compiled by Kodak, the No. 6 Folding Kodak had been available from 1893 to 1895 and the No. 6 Glass Plate Folding Kodak from 1894 to 1896. The No. 4 and No. 5 were mentioned in the Kodak catalogs until 1897. There were no further substantial changes and only the construction of the lens board was adjusted. It is striking that the size of the cameras in 1897 again decreased to 305 cubic inch for the No. 4 and 658 cubic inch for the No. 5.





*Inside of the Stereo Folding Kodak, showing the inserted back frame. Attached to this is a septum.*



**No. 5 Folding Kodak with stereo lenses and shutter.** Because the focal length of the lenses is much shorter than the usual lens, there is an extra distance scale on the drop bed. The lenses and shutter cost an extra £ 7.

**The last version of the Folding Kodak, as illustrated in the 1897 Kodak catalogue.** The lens board is smaller and looks very much like the one of the Cartridge Kodak. The reflecting finder on the lens board is replaced by two small finders in the body.

Due to the changes in the Folding Kodaks since 1893, they were no longer as compact and simple as the previous devices. The promotional texts emphasized the extensive possibilities for the ambitious photographer: the cameras have a versatile shutter, can handle various lenses and allow interventions in perspective and sharpness zone. These are all things that only make sense if the photographer wants to produce perfect photos and has the necessary photo-technical knowledge.

### The end

A total of 8,502 Folding Kodaks were produced. That is not a large number, certainly in comparison with the numbers that are reached a few years later. For example, 147000 Pocket Kodaks were made, 257000 No. 2 Bull's-Eye's and 90000 No. 4 Cartridge Kodaks.

The Production Order Book contains detailed information about the numbers produced:

No. 4 Folding Kodak: 3450. In the book Kodak cameras, the first hundred years, by Brian Coe, it is mistakenly stated that 3750 are made. This is based on an incorrectly summed subtotal in the Production Order Book.

No. 5 Folding Kodak: 4900.

No. 6 Folding Kodak: 152.

There are a couple of reasons for ending the Folding Kodaks series. These are related to the popularization of leisure photography that Eastman Kodak desperately wanted. They understood very well that the potential market for family photographers was huge, and that more people taking photos meant a greater turnover of films and paper - and those, not the cameras, make the most profit. In the first half of the 1890s the Folding Kodaks were still innovative, but soon they are overtaken by developments. They were too expensive, too difficult and too large to play a role in the popularization of leisure photography. So let's have a look at some circumstances and developments.

Around 1890 George Eastman still hoped for a quick breakthrough of rollfilm photography, but that appeared to be too optimistic. He was trying hard with the cheaper Daylight and Ordinary box cameras, but these did not provide a breakthrough. In 1893 and 1894, circumstances were also going against him with a major economic crisis

and technical problems.

An overview of the turnover of all Kodak rollfilm cameras shows the malaise. In 1892 the company sales were nearly \$199,000, but in 1893 the amount dropped to \$88,000, falling to \$58,000 in 1894.

In 1893 an economic crisis arose, with panic on the financial markets, a declining value of shares and a run of American savers on banks to rescue their money. Five hundred banks and fifteen thousand businesses had to cease operation, as well as large numbers of farms. Unemployment was rising and reaching 35% in New York, for example. To put it mildly, these were not optimal conditions for the sale of luxury products such as photo cameras. George Eastman writes: 'In my judgment this winter is going to be the hardest time this country has seen for many years.'

Eastman Kodak, however, was hit even more. In June 1892 dealers suddenly began complaining that the Kodak film was quickly becoming insensitive and spoiled. Due to quite a few staff changes in the film department, alterations to the chemical formulas and a change of supplier of raw materials, finding both the cause and a solution proved difficult. For a while Kodak rollfilm was unavailable, which of course damaged confidence in the still young rollfilm photography and had a negative effect on the demand for Kodak cameras.

After two years of misery the tide turned, but developments had already overtaken the Folding Kodak design. In 1895 rollfilm photography suddenly became popular. Eastman Kodak had always believed in film and now that things were going uphill again, the company opted wholeheartedly for the combination of rollfilm photography and the huge market for family photography. In 1895, sales again rose to more than \$167,000. The \$500,000 mark was reached in 1899. The invention of a practically usable daylight loading rollfilm on spools (Samuel N. Turner, US patent 539,713, May 21, 1895) undoubtedly played a role in this. It had some major advantages over the 'old' film reels: it was changeable in daylight and because of the sequence numbers on the protective paper band, counting mechanisms were superfluous and cameras could be

continues over



## The Folding Kodaks (continued)

manufactured more easily and therefore more cheaply. The first Kodak according to this principle was the No. 2 Bullet from 1895, but it is the small £ 1.05 Pocket Kodak box from 1895 that sold by tens of thousands. In August 1895 the No. 2 Bull's-Eye box of £ 1.65 followed and in 1897 the Folding Pocket Kodak of £ 2.10. These cameras all take smaller photos than the Folding Kodaks, but in 1897 the No. 4 Cartridge Kodak for 4x5 inch photos on daylight rollfilm or glass plates appeared. The camera was available from £ 5.25 and was a simpler but good quality alternative to the No. 4 Folding Kodak.

As I have already described, the Folding Kodaks were only affordable for the well-to-do minority of the population. The prices ranged between £ 10.38 and £ 22.50. To save those amounts, the average factory worker would need to work for 10 to 21 weeks, respectively. It would have taken someone with a modest administrative profession and an annual income of £ 100 about 5 to 12 weeks, respectively. But it is very unlikely that they would ever get such an amount together, because their income was largely or even entirely spent on necessary expenses. The cheaper rollfilm cameras of the second half of the 1890s made photography accessible to larger groups of the population, but only with the 5 shilling Brownie of 1900 did photography come within the reach of many people.

The No. 4 Cartridge Kodak is a good example of another trend from the 1890s, namely that cameras are becoming increasingly compact and smaller. In the more modern devices with daylight spool, the roll holders are an integral part of the camera and they are no longer located behind the image plane, but on the sides. Eastman Kodak was already experimenting with the £7 Flat Folding Kodak for 4x5 inch pictures in 1894, which only had a volume of 193 cubic inch. The later no. 4 Cartridge Kodak is even smaller at 171 cu inch and occupies about half the space of the No. 4 Folding Kodak (266 to 385 cubic inch).

Thus, the new cameras for the family photographer are cheaper, more compact and easier to carry. In addition, they are very easy to operate. In that respect the Folding Kodaks have also prised themselves out of the market. When they appear in 1890, compactness and simplicity are still important selling points. However, the cameras are developed over the years as cameras for the discerning amateur. But the wide range of shutter speeds and apertures, the possibilities of glass plates, ground glass, sliding and tilting lens boards and plate holders require a lot of knowledge and rather deter the family photographer in stead of seducing him or her.

The obsolete design of the Folding Kodaks, the high price, the bulk and the necessary expertise do not contribute to the popularization of photography, as Eastman envisages it. Only five years old in 1895 they belong to the past generation. On 13 November 1895 Eastman Kodak ordered the last two batches of 200 copies each of the No. 4 and No. 5 Folding Kodaks. In the catalogs they get an increasingly modest place and in 1897 they are mentioned for the last time.

Folding Kodak figures						
Ordered at camera factory			Selling price in UK £			
	No. 4	No. 5	No. 6	No. 4	No. 5	No. 6
1889	250	50	0	10.38	12.38	-
1890	450	1100	2	10.38	12.38	-
1891	700	900	0	10.38	12.38	-
1892	800	1500	0	11.38	13.38	-
1893	500	650	150	12.60	14.50	22.50
1894	150	0	0	12.60	14.50	22.50
1895	600	700	0	12.60	14.50	22.50
1896	0	0	0	12.60	14.50	-
1897	0	0	0	12.60	14.50	-
total	3450	4900	152	Price in italics is estimate based on US price and other years		

**Table of numbers of cameras that were ordered at the Brownell camera factory, based on the Production Order Book, and selling prices in England, based on UK Kodak catalogues and advertisements.**

### Resume

In 1890 the Folding Kodak was an innovative rollfilm camera, aimed at the well-to-do family photographer. The acceptance of rollfilms, however, was not as fast as Eastman had hoped and the Folding Kodaks were adapted to the use of glass plates. They also offered more and more options that were important for the ambitious amateur. Improvements in camera construction and the invention of daylight rollfilm made photography cheaper and easier. From 1895, more modern cameras appeared, which were more compact and easier to operate. This was of great importance for the popularization of photography and tapping into the vast new market for family photographers. The Folding Kodaks no longer played a role in that game and soon belonged to the old guard. Seven years after the introduction, the curtain fell on them.

### References

- Kodak catalogs 1889-1897
- Reese V. Jenkins (1987), *Images and Enterprise: Technology and the American Photographic Industry 1839-1925*
- Elizabeth Brayer (1996), *George Eastman, a Biography*
- Easton S. Lothrop, Jr. (1982), *A Century of Cameras*
- John Birch and co., ltd. (1895) *Photography, its materials and appliances*, p. 22, 23
- Columbus Kodaks. In: *The Westminster Budget* (29 September 1893), p. 37
- J.F. Shew & Co. (1891), J.F. Shew & Co. : inventors, manufacturers and patentees of specialties in photographic apparatus and dealers in every description of photographic materials and apparatus, p. 27, 28
- E. Vogel (1913), *Taschenbuch der Photographie*
- Henry Sturmey (1892), *Photography annual*, p. 339, 340, 721
- Film photography. In: *The Photo-Miniature* (April 1902) No. 37
- <http://www.waynesthisandthat.com/servantwages.htm>
- <https://bit.ly/2Ut2ZF7>
- <http://sites.rootsweb.com/~irlcar2/wages.htm>
- [https://usa.usembassy.de/etexts/his/e\\_prices.htm](https://usa.usembassy.de/etexts/his/e_prices.htm)
- Arthur L. Bowley (1900), *Wages in the United Kingdom in the nineteenth century*
- Michael G. Mulhall (1898), *The dictionary of statistics*
- Nelson W. Aldrich (1893), *Wholesale prices, wages, and transportation, part 2*
- [https://en.wikipedia.org/wiki/Panic\\_of\\_1893](https://en.wikipedia.org/wiki/Panic_of_1893)
- <http://www.dofmaster.com/dofjs.html>
- U.S. Patent No. 442216
- Correspondance with Todd Gustavson of the Eastman Museum, Rochester, 21 July 2019, containing copies of the Production Order Book, the Camera Chronology, the company Card File