

The Legacy of the Boston *Bull's-Eye* Camera

by Jos Erdkamp



Figure 1. The regular Bull's-Eye camera, made by Boston Camera Manufacturing Company from 1892 to 1895. Photo by Jos Erdkamp.

The history of camera construction includes a number of milestones, and anyone with a bit of interest in the topic will be able to name a few. Although the Boston Bull's-Eye camera may not appear on every list of well-known devices, it deserves a place in the spotlight. The first model (figure 1), manufactured from 1892 to 1895, was important for photographers because for the first time it brought together three essential innovations that have simplified amateur photography considerably. In the first half of the 1890s the design

meant a big step forward, and these innovations were applied essentially unchanged in millions of box cameras over the next seventy years.

Historical Context

The years immediately before and after 1890 saw rapid development in camera design. Creative constructions prevailed, and a range of fascinating equipment emerged as a result.

In 1888 and 1889 George Eastman caused a sensation with his Kodak roll-

film cameras. They were very simple to use: point the camera at the subject; press the button; and turn the key to advance to the next frame. When all the frames on the spool were exposed, you mailed the camera to the Kodak factory, where the film was developed and printed. Your pictures and your camera, loaded with new film, were mailed back to you. Other roll-camera manufacturers tried to copy Eastman's success with their own devices, but they were hampered by the many patents Eastman had obtained to protect both

his camera designs and his processes. Therefore the competitors had to invent something not yet patented.

Meanwhile, like their roll-camera counterparts, manufacturers of amateur glass-plate cameras were introducing innovations as well, by trying to make their instruments as user-friendly and simple as roll-film cameras. However, these designs were not always practical. Take for example the Radial camera, a plate camera made by the Marion Company Limited of London. Before using the camera, it had first to be held with the lens facing the ground, to allow a glass plate to drop into an internal plate holder mounted on a rotating disc aligned with the plates in the back of the camera. Then the plate had to be rotated into position for taking photos. Another awkward instrument was the Mars Detective camera, made by Emil Wünsche of Dresden, Germany. On this model, the glass plates were changed by turning the camera upside down and inserting the plates into an attached external holder.¹

In contrast with the efforts of the glass-plate camera designers, designers and inventors who sought to simplify roll-film cameras by building lighter, more compact devices created a number of ingenious constructions. The Bull's-Eye is one result. It appeared on the market around May 1892, when Samuel N. Turner established the Boston Camera Manufacturing Company to sell this camera. The cameras themselves seem to have been manufactured by two Massachusetts companies: the Blair Camera Company in Boston, and the American Camera Company in Northborough. However, it is unknown which factory manufactured which models, or whether both facilities manufactured all models of the Bull's-Eye.²

The Boston Camera Manufacturing Company should not be confused with the Boston Camera Company, a different firm started by Samuel N. Turner. The latter was founded in the summer of 1884 and taken over by the Blair Camera Company in 1890.³ Turner left the Blair Camera Company to start manufacturing cameras for Thomas Blair himself, after Blair was thrown out of the Blair Company's management in the early 1890s. In May 1892, the Blair Camera Company's directors gave Turner permission to revert to using the former Boston Camera Company name.⁴ However, Turner decided instead to coin a new name, Boston Camera Manufacturing Company.⁵

The Boston Bull's-Eye of 1892 was historically important because it combined three innovations for the first time: daylight-loading roll film, a red window that displayed the exposure number, and a front-roll design (explained below). Over the next seventy years this configuration of features appeared on millions of box cameras that flooded the worldwide camera market. The materials used may have changed over the decades from wood to cardboard to metal to plastic, but the basic combination and design of these three features remained unchanged. Each of these innovations warrants closer investigation.

Innovation 1: Daylight-loading Roll Film

Carriers for photographic emulsion that were flexible, not rigid, appeared quite soon after the invention of photography, mainly in the form of sensitized paper. These carriers were convenient because they could replace heavy hard plates—which in the case

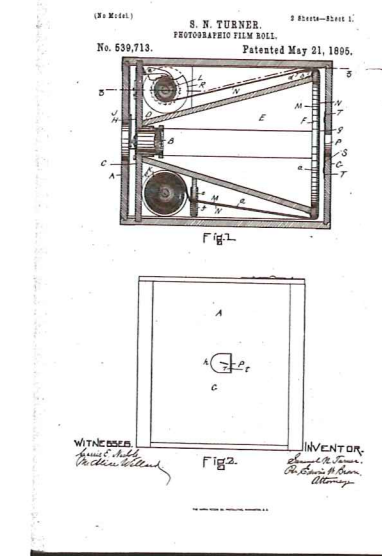


Figure 2. Sketch of Samuel Turner's camera design, United States Patent 539,713.

of glass plates were fragile as well. In 1854 in England, Joseph Spencer and Arthur Melhuish obtained a patent on a roll holder that used calotype paper, but it was not a commercial success. Also in England, Leon Warnerke introduced a roll holder for film in 1875 that met with moderate success, as did the inventions of a few others.⁶ The year 1887 marked the appearance of the first camera designed for flexible roll film, which sported a built-in roll holder. This was the American Detective camera, made by Rudolph Stirn of Berlin but patented in the United States.⁷ George Eastman followed in 1888 with his roll-film cameras, and soon there were many roll-film models on the market. However, the major disadvantage was that these cameras had to be loaded in the dark because the roll consisted of a long strip of sensitive film wound around a wooden core without any protection against light.

Then, in 1891, Eastman Dry Plate Company (as Eastman Kodak was known until 1892) introduced the Daylight Kodak, which could be

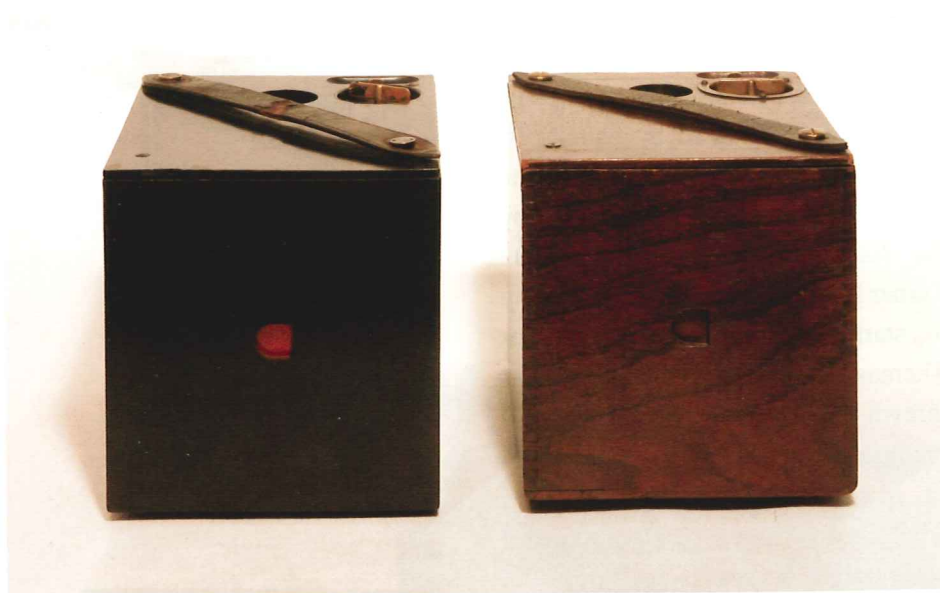
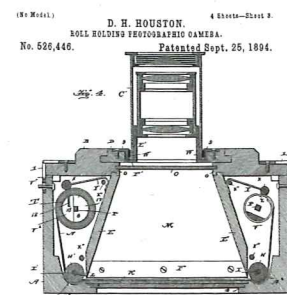


Figure 3, left. D-shaped windows on two regular Bull's-Eye cameras. Photo by Jos Erdkamp. Figure 4, right. David H. Houston's design for a camera using front-roll film.



loaded in subdued light with a roll of film packaged in a box. This was a small improvement but still not an ideal solution. A much better idea emerged in 1891 at the Blair Camera Company, which introduced the innovation of winding a light-proof paper strip outside the film on the spool. Because the paper strip was longer than the film, it protected the sensitive film at the beginning of the roll when the camera was loaded and at the end of the roll when the film was removed from the camera for processing.⁸ A British captain named H. J. Barr had devised this system around 1855 during his stay in India, but he never manufactured it.⁹ Meanwhile, to prevent light from penetrating the coil of film at the sides, a metal disc was attached to each end of the wooden core of the spool. Then the film roll could be safely inserted into or removed from the camera in daylight. Each film roll could take twelve shots (figure 2). For this invention Samuel N. Turner received United States Patent 539,713, in an application filed on April 21, 1892 and granted on May 21, 1895. This was the

design—used for the next 120 years—that was first applied in the Boston Bull's-Eye camera.

Innovation 2: The Red Window

In those early days, moving a strip of film into position to take a new exposure was not as easy as it is in modern film cameras. Photographers had to answer a number of questions we might take for granted today: How far do I advance the film to ensure I'm not taking the next picture over part of the previous one? How do I know I'm not wasting a lot of expensive film between each shot? How many exposures are left on this roll?

Designers devised various means to tell the photographer when film was correctly lined up for exposure and the number of exposures left on a roll. Even Warnerke had devised a window in the back of his holders to display frame markings and a mechanical clicking device to indicate when the film was correctly positioned for the next shot. On other models the pointers or mechanical clicking devices were

external. The disadvantage of all these constructions was that they were expensive to manufacture and not always reliable.

The solution appeared in Samuel N. Turner's patent, and it consisted of a little red window on the back of the camera that permitted viewing a sequence of numbers printed on the back of the protective paper strip attached to the film roll (figure 3). To prevent light from fogging the film, the window was covered with a transparent red membrane. In those days emulsions were either barely or not at all sensitive to this color, so red light entering the film chamber did no harm. The red window was cheaper to manufacture than pointers or clicking devices and made the camera easier to use.

Innovation 3: Front-roll Design

When separate film holders for roll-film cameras were first introduced, they were attached to the back of the camera, similar to the way glass plates were held by plate holders in plate cameras. The first roll-film Kodak cameras expanded

on this principle. They used a built-in roll holder in the back of the camera, behind the image plane.

Some inventors had other ideas about the placement of the spools. Probably the first person who came up with the idea of placing both the feed and take-up spools in front of the film plane was H. J. Redding of England, as seen in British Patent 17,328, granted November 28, 1888.¹⁰ He placed the two spools behind the lens board, one on either side of the lens opening. In the same vein, Henry B. Good and David H. Houston (figure 4) each patented a device similar to Redding's between 1889 and 1893. Early cameras built to these designs include Good's Tambosa of 1890, Redding's Luzo of 1889, and the Blair Camera Company's Kamaret of 1891.¹¹

The front-roll design made these cameras about one-third shorter from front to back than previous designs. Especially for tourists and day trippers, the reduction in size was, understandably, an important improvement.

Description of the First Bull's-Eye

The 1892 Bull's-Eye camera—the first camera to combine all three of the

above innovations—measures $4\frac{1}{2} \times 4\frac{3}{4} \times 5\frac{4}{5}$ inches (W x H x D), weighs 34.2 ounces in the Ebonite version (Ebonite was an early plastic) and 19.8 ounces in the wooden version, and takes $3\frac{1}{2} \times 3\frac{1}{2}$ -inch photos on roll film. On the front of the camera are two round openings, one above the other. In the lower opening the shutter is visible. This shutter is a simple element that moves to and fro, does not need to be cocked, and is operated by moving a lever left or right (figure 1). The shutter was designed by Frederick H. Kelley at Blair Camera Company in 1892, and it was a modification of Abner G. Tisdell's shutter (United States Patent 464,260).¹² On one of my own Bull's-Eye cameras, I measured a shutter speed of about $1/20$ th of a second, but that is only one measurement.

Worth noting are arrows on the shutter that indicate the direction in which the shutter release lever must be moved. This is very useful because the lever normally rests in the middle position, and without the arrows the photographer would not know in which direction to move the lever. The lever is pushed to the right and left alternately on each successive frame.

For example, if the lever is moved to the right for the first exposure, it is moved left for the second. If the photographer pushes the lever in the wrong direction, he doesn't hear the shutter click and would be unsure whether the photo was taken or not. The arrows help eliminate this confusion and allow for faster reaction time in taking snapshots.

The Bull's-Eye shutter can be used for timed exposures, but there is no catch or button to do so. The photographer must stop the shutter blade with a fingernail when it moves across the lens. A small pin in the shutter blade on the right side of the aperture helps the photographer catch it in mid-movement. In my Ebonite model a peg then falls into a notch to keep the shutter in the open position. My wooden version does not have this lock. Primitive, yes, but I believe Bull's-Eye users did not really mind; as amateurs they likely had little use for a timed exposure setting.

The Bull's-Eye camera has a fixed-focus meniscus lens. It is hidden behind the shutter and has a focal length of about $4\frac{1}{3}$ inches and a maximum aperture of $f/17.5$. It takes



Figure 5, left. Film roll holder for the regular Bull's-Eye. Photo by Jos Erdkamp. Figure 6, right. Advertisement from *American Amateur Photographer* promoting three models of the Bull's-Eye.

ADVERTISEMENTS. xi

The 3 Bull's-Eyes
MOST POPULAR CAMERAS

Regular Bull's-Eye for 3½ square pictures, uses Film Cartridges **\$8**

Improved "Special" for 3½ square pictures, uses Light-proof Film Cartridges and Glass Plates **\$10**

4x5 Bull's-Eye lightest and most compact camera of this size without folding. For Cartridges only. **\$15**

SEND FOR LATE CIRCULARS.
Boston Camera M'fg Co., 380 Tremont St., Boston.

sharp pictures from distances of about eight feet and farther.

On the front side of the camera there is also the lens of the small reflex viewfinder. On top of the camera is the finder's round ground glass, the attachments for a strap, the shutter lever, and the key for winding the film.

On the back side of the camera is the D-shaped red window that displays the frame number. The curious D shape is characteristic of Boston Bull's-Eyes. The explanation for the D shape can be found in Samuel N. Turner's patent 539,713 for the daylight spool and red window. He writes: "Underneath each figure on the opaque sheet is a straight line *r*, which is intended as a guide to indicate when to stop moving the strips, the strips being stopped when such a line comes in line with or close to the edge *t*, of the opening P." The red window needed a straight side to allow the photographer to align the markings on the film, hence the D shape. In daily practice, this alignment proved unnecessary, so later cameras used a simple round window.

The camera can be taken apart by removing a screw in the bottom panel, after which the camera top

and the internal mechanism can be lifted from the camera box. This screw is not embedded in the bottom panel but protrudes from the panel, preventing the camera from standing stably on a table or other flat surface. Also, there is no tripod nut present, so some improvisation was required if the photographer wanted to make a timed exposure. But, as noted above, the average user would have had little use for timed exposures.

The camera's interior is made almost entirely of wood, with only a few metal parts, such as the shutter and a pressure plate in the back.

The overall construction of the Boston Bull's-Eye camera may seem rather basic to us now; however, in 1892 this camera was a big step forward. It was compact and simple to use. The front-roll design made it shallower than other cameras; there was no complicated or heavy film-holding mechanism, and the film roll could be changed in daylight (figure 5). At the same time, it should be made clear that the Bull's-Eye was not a device for the professional photographer or even the demanding amateur. It was built as an appliance

for the enthusiast who merely wanted to capture a few happy moments.

Models and Variants

Advertisements from the Boston Camera Manufacturing Company mention a total of three models:¹³

1. Bull's-Eye
2. Special Bull's-Eye
3. 4 x 5 Bull's-Eye

The simple Bull's-Eye took $3\frac{1}{2} \times 3\frac{1}{2}$ -inch photos and was produced in a number of variations, some of which are mentioned in photographic historical literature. I have seen a couple of variants at auctions, and a few others are described in ads contemporaneous with the camera's manufacture and sale. Various sources collectively identify the following options—and their original prices—available for the three Bull's-Eye models:

- a. Wooden box, without leather (\$7.00)
- b. Wooden box with leather covering (\$8.00)

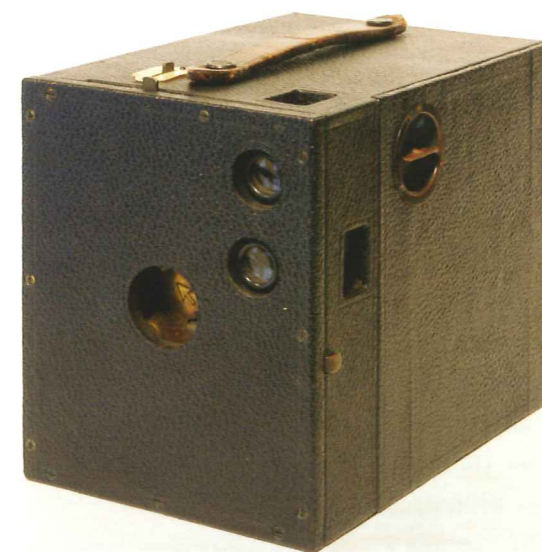


Figure 8, left. The 4 x 5 Bull's-Eye. Figure 9, right. Front side of the 4 x 5 Bull's-Eye with shutter mechanism visible. Photos by Jos Erdkamp.

- c. Ebonite box, manufactured 1893–1894 (\$7.00)
- d. Variant $3\frac{1}{2}$ -inch diameter picture instead of square pictures (cost unknown)
- e. Variant offering a choice of apertures (cost unknown)
- f. Variant with a round instead of D-shaped red window (cost unknown)

Exactly which of the models *a*, *b*, and *c* could be ordered as variants *d*, *e*, and *f* is unknown to me (figure 6).

A notable feature on this list of options is the use of Ebonite in one of the models, which provides a very early example of the incorporation of plastic in a manufactured product. Ebonite is a type of extra-hard vulcanized rubber that is still used today in, among other things, bowling balls, musical instrument mouthpieces, and smoking pipes. The Ebonite Bull's-Eye camera has a very modern appearance, with smooth surfaces and clean-cut lines. However, one disadvantage of Ebonite is its weight—this model weighs over fifty percent

more than the wooden version (figure 7).

Like the regular Bull's-Eye, the Special Bull's-Eye model took $3\frac{1}{2} \times 3\frac{1}{2}$ -inch pictures on roll film, but it could also take pictures on glass plates by means of a holder that contained two plates back to back. The dimensions are approximately the same as with the regular model, except that the camera is one half-inch longer, from back to front. The selling price was ten dollars. I do not have a Special in my collection, and what I know of it is gleaned from printed sources.

I have seen an advertisement that mentions an "Improved Special Bull's-Eye," but the ad does not make clear whether this is an improved version of the Special or just a way of saying that the Special itself was an improvement over the regular model. The image in the ad shows a camera that differs in construction from the regular model—the side panels have hinges near the front that can be opened. The back panel can be removed from the camera. This construction style was probably necessary to allow attachment of a double plate holder.¹⁴

This same ad also shows evidence that the three innovations were used in this camera's design. In the front half of the camera a compartment indicates the use of the front-roll design. The D-shaped window in the back panel is clearly visible, meaning the camera used daylight-loading roll film with numbering on the protective paper strip.

The 4 x 5 Bull's-Eye took 4 x 5 photos on roll film and cost fifteen dollars (figure 8). The dimensions are $5\frac{1}{3} \times 6\frac{1}{2} \times 8\frac{1}{4}$ inches (W x H x D), and it weighs 47.6 ounces. A comparison with the No. 4 Kodak (known as a string-set camera, because the shutter was set or cocked by pulling on a string outside the box) and the Kodak C Ordinary, 4 x 5-inch contemporaries of the 4 x 5 Bull's-Eye, shows that the Bull's-Eye was significantly smaller and lighter.

Behind the lens opening in the center of the front panel of the 4 x 5 Bull's-Eye, the brass plate of the shutter is visible (figure 9). Arrows are engraved on this plate to indicate shutter direction.



Figure 7. Bull's-Eye cameras with three kinds of finishes. From left to right, Ebonite, wood, and leather. Photo by Jos Erdkamp, camera on the right courtesy of Everard and Company Auctions.

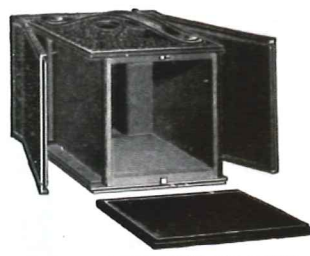
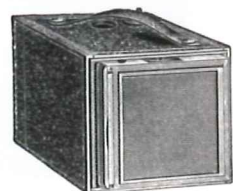
FIG. 1. IMPROVED BULL'S-EYE CAMERA.
(See page 279.)FIG. 2. IMPROVED BULL'S-EYE CAMERA.
(See page 279.)FIG. 3. PLATE HOLDER ATTACHMENT
BULL'S-EYE CAMERA.
(See page 279.)

Figure 10, left. Illustration from *American Amateur Photographer*, May 1895, showing the Special, also known as the Improved, Bull's-Eye model. Figure 11, right. Price list describing models, optional features, accessories, and cost of each for the Bull's-Eye.

In the upper right corner of the front panel there are two lenses, one for each of the reflex viewfinders, allowing for portrait and landscape orientation. After removing the front panel we find a simple rotary shutter. This shutter is different from that of the regular Bull's-Eye, which sports a to-and-fro element. The rotating shutter is very similar to that of the Kodak Bullet and the later Kodak Bull's-Eye box cameras, manufactured from 1896 to 1913. This shutter has only one speed. Although this limitation cannot be changed, the user may take timed exposures. When a slider on the side of the box is pulled out, it catches a pin on the edge of the rotating shutter disc, which stops the movement of the disc and allows the user to control the shutter manually.

When looking at the camera's front, the right side panel shows the slider for the shutter's T-setting, the ground glass of the reflex viewfinder, and the film-winding key. The key can be turned in only one direction, so the

film spool cannot unwind. When the key is turned one hears the rattle of a ratchet wheel, attached to the spool by three pins. Remarkably, the key can simply be drawn out of the camera. There is no screw thread at the end of the rod that runs through the core of the film spool, and putting the key back into the camera again is quite difficult, as the square end of the rod has to engage a square hole in the ratchet wheel.

The left side of the camera is featureless except for a flat screw. Removing this screw allows the film-holder mechanism to be removed from the box. In the middle of the back panel is the D-shaped red window.

On top of the camera are the lugs for a carrying strap, a second ground glass for the reflex viewfinder, and the shutter button, which is actually a small lever that can be pushed to the left and right. The arrow visible through the lens opening on the front of the camera shows the direction in which the lever must be moved to open the shutter. Also

visible on the top of the camera is a small lever set into an ivory plate. This lever sets the focus distance. If taking a picture of up to about $3\frac{1}{2} \times 3\frac{1}{2}$ inches, it is possible to use a fixed-focus lens, and everything between eight feet to infinity will be rendered sharp. With picture sizes of 4×5 inches and larger it is not possible on this model to use a fixed focus lens, because it would limit depth of field to, for instance, objects beyond 100 feet.¹⁵ One would not be able to photograph objects closer than that distance. Of course, that kind of limitation would have been unacceptable for the average Joe who wanted to take a snapshot of his wife and kid.

As a consequence, the 4×5 Bull's-Eye had to have some sort of focusing mechanism. When the lever in the ivory panel on top of the camera is pushed toward the front, the lens inside the camera moves rearward toward the infinity setting. By sliding the lever backwards, the lens moves forward nine millimeters to allow close-up shots. On my model

of the 4×5 Bull's-Eye, no distance marks are visible on the ivory plate any more—they probably have worn off—but according to a drawing made in 1894, there would have been marks on this plate in a brand-new model.

The bottom of the camera comprises a leather-covered panel with no tripod nut. This means the camera was intended as a hand-held instrument for the snapshot photographer. For timed exposures, the camera could be put on a table or other flat surface, as the protruding screw present on the bottom panel of the regular model was located on the side panel on this model.

The part of the camera that contains the film-holding mechanism can be removed from the camera completely, while the shutter and lens remain attached to the camera body. The front panel of the film holder is painted matte black and has a large circular opening in the center. When the focusing lever is set on infinity, the lens slides towards the back, into this circular opening. In this position the film holder cannot be removed from the box.

Directly behind the front panel of the roll-holding mechanism are the compartments for the two film spools. The feed spool is on the bottom side and is held in place by a $4\frac{1}{2}$ -inch rod through its core. When loading the camera the spool is put into the compartment first, then the rod is inserted through a hole in the side panel of the camera. On the other side of the feed spool the rod fits into a small opening. A rotating copper strip on the insertion side of the spool prevents the rod from falling out of the holder. Primitive? Certainly, but it works and was cheap to produce.

When loading the camera the protective paper strip on the roll of

film is pulled towards the back of the camera. The instruction "Start the paper underneath this crosspiece" is printed on the piece of wood that connects both sides of the film holder. From the crosspiece, the film winds past a soft felt corner and crosses the focal plane. It then winds past a second felt corner, under another crosspiece, and onto the take-up spool.

A paper label on the internal roll-holding mechanism confirms the identity of the camera: "In ordering supplies specify for 4×5 Bulls-Eye camera. BOSTON CAMERA MFG Co., Boston, Mass." Additionally the text "PATENTED DECEMBER 1, 1891 OTHER Pat's PENDING" is embossed in a wooden panel inside the box. This is the date of the shutter patent for the Regular Bull's-Eye camera. However, this shutter is not the one used in the 4×5 Bull's-Eye. I have not been able to find another patent of a shutter with the date December 1, 1891 in the database of either the United States Patent Office or Google Patents.

The exact date the 4×5 Bull's-Eye appeared on the market is difficult to pin down. I found mention of this model in an advertisement in *The American Amateur Photographer*, December 1893, which says, "Send for circular of new 4×5 Bull's-Eye." An 1894 promotional booklet titled "Stray Bits at the World's Fair" also provides a clue to the introduction date. It says, "The great success of the Bull's-Eye camera ... has led to the manufacture of a larger size camera having the same general features."¹⁶ These ads indicate that the regular model appeared before the 4×5 model. Also in 1894, various ads appeared advertising the fifteen-dollar 4×5 Bull's-Eye. The latest-dated ad I have found is dated

August 1, 1895—the same month in which Eastman Kodak Company (renamed in 1892 from Eastman Dry Plate Company) bought out the Boston Camera Manufacturing Company.

Today, all three Boston Bull's-Eye camera models are considered rare, the regular model being the one most often seen at auction. The regular model also comes up for individual sale once in a while. On the other hand, the Special and the 4×5 are as good as unobtainable. In fact the drawing of the Special illustrated herein is the only image I have been able to find of this model (figure 10).

Processing and Printing Service

Worth noting is the developing and printing service that was offered by the Boston Camera Manufacturing Company, though this service was not the first of its kind. In 1888, Eastman Dry Plate Company introduced a service that for the first time spared photographers from the technical task of developing and printing their film. At this time, a Kodak camera cost twenty-five dollars and came loaded with film for 100 exposures. When all the shots on the roll of film had been taken, the photographer could send the camera, with the film still in it, to the Kodak factory, where the film was taken out and developed. The pictures were then printed and mounted on cards. The company charged ten dollars for this service (figure 11).¹⁷

By offering a film-processing service, Eastman made photography more attractive to large numbers of consumers, who were interested in taking pictures but not in the technical tasks of developing and finishing them. One drawback, however, was that the photographer had no camera at

Price List.

The "Bull's-Eye" Camera, leather covered, for $3\frac{1}{2} \times 3\frac{1}{2}$ pictures, with one "Light-proof" Film Cartridge	\$8.00
The Special "Bull's-Eye" Camera, leather covered, for $3\frac{1}{2} \times 3\frac{1}{2}$ pictures, with one "Light-proof" Film Cartridge, one Double Plate Holder, and one dozen Glass Plates	10.00
The 4×5 "Bull's-Eye" Camera, leather covered, with one "Light-proof" Film Cartridge	15.00
$3\frac{1}{2} \times 3\frac{1}{2}$ 12 Exposures12
4×5 12 Exposures30
"Light-proof" Film Cartridges	1.25
Developing, Printing, and Mounting 4×4 plain cards	1.00
Developing, Printing, and Mounting, extra finish, 4×5 paper and gold-edge cards	1.25
Developing and Printing (to mount in albums)85
Printing and Mounting 4×4 plain cards	1.10
Printing and Mounting, extra finish, 4×5 paper and gold-edge cards80
Printing only (to mount in albums)60
Developing only60
Double Plate Holders for Special "Bull's-Eye"	1.00
Developing and Printing Outfits	2.00
Silver Print Outfits	1.50
Leather Carrying Cases	1.25
Albums	2.00
Extra Plugs15
Cards for Mounting, 4×4 plain, per 10075
Cards for Mounting, 4×5 plain, per 100	1.25
Cards for Mounting, 4×5 gold-edge, per 100	1.25
Enlargements of "Bull's-Eye" Pictures, on Bromide paper, 8×8 , or 8×10	1.00
Postage	3 cents each.
Postage on Cartridges	13 "
Postage on Leather Carrying Cases	5 "
Postage on 1 dozen Negatives and Prints	5 "
When postage is not included in remittance, goods will be sent by express.	
BOSTON CAMERA MFG. CO.,	
380 Tremont Street, Boston, Mass.	

his disposal while the film was being processed. By contrast, with Boston Camera Manufacturing Company's cameras, it sufficed to send in only the roll of film for processing, not the whole camera. Hence a photographer could load his camera again and continue snapping photos. Also there was no risk of damage or loss of the camera itself, either in the mail or during film processing.

The Boston Camera Manufacturing Company charged \$1.25 to develop, print and mount twelve shots. A more luxurious finish on gold edge cards cost \$1.60 for 3½ x 3½-inch and \$1.75 for 4 x 5-inch prints.¹⁸ The cost per print was roughly comparable to Kodak's price for processing.

Purchase of Boston Camera Company by Eastman Kodak

The period in which Bull's-Eye cameras were manufactured was notable for the sheer number of new camera designs entering the market. For example, there were the Kamaret, Luzo, Kodak, and Hawkeye cameras. With so many choices available, it is entirely possible that the prospective buyer was dazzled by the number of camera models on the market and perhaps overlooked the Bull's-Eye, however innovative it was. It is also possible that the financial crisis that began in 1893 contributed to the commercial failure of the Bull's-Eyes, whose sales were rather disappointing. It was only after George Eastman took matters in hand that the Bull's-Eyes became successful.

George Eastman recognized a good idea when he saw one, and that was certainly the case with the Bull's-Eye camera. At first, he regarded the Bull's-Eye's innovative design as a

threat to his own line of cameras and tried to hinder its production on legal grounds, claiming that it infringed on Eastman patents. When that approach did not succeed, Eastman changed course and started to use the design himself.¹⁹ On December 15, 1894 Eastman ordered the manufacture of an initial batch of 200 cameras that copied the Bull's-Eye design. This camera was called the No. 2 Bullet (figure 12), and the initial batch was shipped from the Eastman factory on February 15, 1895. It reached the market the following month. Eastman appears to have been so confident in the Bullet's marketability that in February and March 1895 he ordered another 1,500 Bullets even before the first Bullets became available for purchase.²⁰

The only difference between Kodak's Bullet and the original Bull's-Eye camera was the shutter (figure 13); the rest of the Bullet was a direct copy. Consequently, on June 4, 1895 lawyers of the Boston Camera Manufacturing Company informed Eastman Kodak that the Bullet infringed on two counts: the Houston front-roll patents (526,445 and 526,446) and the Turner daylight film patent (539,713). Negotiations resulted in Eastman securing a license for the Turner patent on June 25, 1895.²¹ It didn't take long before Eastman realized it would be far more profitable to own the patent than to pay licensing fees. Hence, on August 10, 1895 Eastman Kodak Company bought the Boston Camera Manufacturing Company outright from Samuel Turner for \$22,000 plus the value of the latter's inventory.²²

To George Eastman's disappointment, the Houston patents were not included in the deal because of stipulations in the original license

contract between Turner and Houston.²³ Eastman was not a man to be stopped easily, and he simply continued to manufacture the Bullet, the Bull's-Eye, and his Pocket Kodak cameras, which also used the three innovations present in the Bull's-Eye.²⁴

At the same time, the Boston Camera Manufacturing Company's own management structure was in flux. The company had been established in May 1892 to sell Bull's-Eye cameras. It also supplied cameras to the European Blair Company, owned by Thomas Blair, who had been Turner's silent partner in the Boston Camera Manufacturing Company.²⁵ At the time of the Eastman Kodak deal, Blair had been in England tending to his European Blair Company. When he came back to the United States in September 1895, he not only found that his supply company had been taken over, but also the Turner patent was now in the hands of the competitor.²⁶ Consequently, he was not amused.

However, it is possible that Blair had already sold his interests in the Boston Camera Manufacturing Company to Turner in late August 1895, before the takeover.²⁷ In any event, Blair then started another firm, the American Camera Manufacturing Company, to continue supplying both his European Blair Company and the American market with cameras. It is not clear when American Camera was started. In his book *Images and Enterprise*, Reese V. Jenkins says it was 1896, but this year may not be correct because the company is known to have sent a letter to the photographic trade on November 25, 1895.²⁸ Whatever the timeline, the American Camera Manufacturing Company secured an exclusive license for the Houston patents and continued manufacturing cameras similar to the

Bull's-Eye, called Buck-Eyes.²⁹

There are varied accounts about how things progressed after the Eastman Kodak deal took place. Jenkins says that in December 1897, Blair and Eastman returned from Europe on the same steamer, and on the ship they started negotiations to allow Eastman's takeover of the American Camera Manufacturing Company.³⁰ Another story comes from *The Federal Reporter* in 1915, which says Blair agreed to help Eastman secure the Houston patents, and, if he succeeded, Blair would receive \$15,000 for his services.³¹ A third story comes from Elisabeth Brayer's book *George Eastman, a Biography*. Brayer explains that in February 1898 David H. Houston, owner of the Houston patents, called at the Eastman Kodak office with an offer for Eastman to buy him out.³² I have no reason to doubt any of these stories, and they do not exclude each other. In the end,

on March 4, 1898 a deal was made between Blair, Houston, and Eastman. Eastman Kodak Company bought out the American Camera Manufacturing Company and the two Houston patents. The previous license agreements with Blair were included in the deal.³³

With Eastman Kodak's 1895 acquisition of the Boston Camera Manufacturing Company, production of the Boston Bull's-Eye came to an end. However, as previously mentioned, the camera continued to be manufactured under the name No. 2 Bull's-Eye Kodak, which appeared on the market as early as August 1895. This camera was made until 1913, and approximately 257,000 were produced.

After the acquisition of Boston Camera, Eastman Kodak continued to build the 4 x 5 Bull's-Eye in a slightly modified version, known as the No. 4 Bull's-Eye Kodak. This successful camera was produced from 1896 to 1904, during which time 37,000 were made.

Eastman Kodak Company also produced a No. 2 Bull's-Eye Special, but this camera has little in common with the Boston Special Bull's-Eye. The Kodak Special had a better lens and shutter, but it could not accommodate a glass plate holder, which was the special feature in the Boston instrument. However, the Kodak No. 2 and No. 4 Bullet cameras are descendants of the Boston Bull's-Eyes. The 1895 copycat No. 2 Bullet was redesigned and continued as the No. 2 Bullet Improved. Both this model and the No. 4 Bullet could accommodate both roll film and glass plates.³⁴

Afterword

George Eastman was justifiably motivated to obtain the rights to the Bull's-Eye design, because the three innovative features—front-roll design, red exposure window, and daylight-loading film—simplified

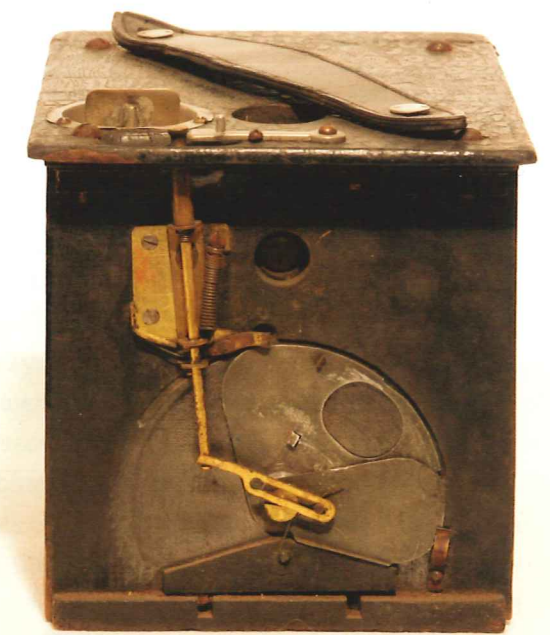


Figure 12, left. The Kodak No. 2 Bullet. Figure 13, right. The Kodak No. 2 Bullet with shutter mechanism visible.

amateur photography considerably. The various models of Bull's-Eyes made by the Boston Camera Manufacturing Company were not a commercial success, and all are rather rare today. But after Eastman Kodak purchased the company and all the important patents, the Bull's-Eyes were successfully continued as Kodak cameras, which allowed the design features of the original Bull's-Eye to set the standard for box cameras well into the twentieth century. They are truly landmark cameras. ●

About the Author

Jos Erdkamp works as a teacher, librarian, and author in Limburg province in The Netherlands. He started collecting antique cameras in 1983, when he bought his first Brownie camera at a village fair. Within a year he decided to specialise in collecting early Kodak cameras. Since the late 1980s he has published twenty-one articles in the Dutch collectors journal *Fotohistorisch Tijdschrift* and in *Photographica World*. Some of these articles are about Kodak, but some

address other topics, as his primary interest is the relationship between technical innovations, photographers, and the photos they produce. One of his most notable articles studies the work of Theodor Scheimpflug, a pioneer of aerial photo-cartography; another looks at the work of George Lawrence, who used kites to photograph San Francisco after the 1906 earthquake. He has also published seven novels. His articles on photography are available online at www.kodaksefke.nl/my-articles.html.

Endnotes

- 1 Brian Ce, *De camera van Daguerre tot nu* (Alphen aan den Rijn, Netherlands: ICOB, 1982), pp. 69–70.
- 2 *Anthony's Photographic Bulletin*, December, 1895, p. 393.
- 3 Reese V. Jenkins, ed. *Images and Enterprise: Technology and the American Photographic Industry 1839–1925* (Baltimore: Johns Hopkins University Press, 1987), p. 137.
- 4 Elizabeth Brayer, *George Eastman, a Biography* (Rochester, NY: University of Rochester Press, 1996), p. 189.
- 5 William Marder and Estelle Marder, *Anthony: The Man, The Company, The Cameras* (Ft. Lauderdale, FL: Pine Ridge Publishing Company, 1982), pp. 276–279; Jerry Smith, "The Saga of the Mystery Bull's-Eye," *The Journal: New England Journal of Photographic History*, no. 120–121, 1988: p. 20–21.
- 6 "Film and Plate Holders," *Early Photography*, accessed June 11, 2013, <http://www.earlyphotography.co.uk/site/holders.html>.
- 7 Carroll W. Pursell, ed., *Technology in America: A History of Individuals and Ideas*, 2nd ed. (Boston: The MIT Press, 1990), p. 133.
- 8 Easton S. Lothrop, Jr., ed., *A Century of Cameras* (Dobbs Ferry, NY: Morgan & Morgan, 1982), p. 37.
- 9 Marder and Marder, *Anthony*, p. 368.
- 10 "Description of Captain Barr's dark slide for the paper process in the camera," *Notes and Queries*, vol. 11, no. 286, April 21, 1855: pp. 311–312. Information about Captain Barr's military affiliation, i.e. whether army or navy, is not documented.
- 11 "Luzo Hand Camera No. 219," Christie's Inc., http://www.christies.com/lotfinder/lot_details.aspx?intObjectID=4028337#top
- 12 Coe, *De camera van Daguerre tot nu*, p. 87; Lothrop, Jr., *A Century of Cameras*, pp. 61–70.
- 13 Smith, "The Saga of the Mystery Bull's-Eye", p. 20–21.
- 14 *American Amateur Photographer*, vol. 7, 1895: p. 230.
- 15 *Ibid.*
- 16 "Stray bits at the World's Fair by a Bull's-Eye", Boston Camera Mfg. Co., 1894, p. 28, <http://pds.lib.harvard.edu/pds/view/2846509>.
- 17 *Ibid.*
- 18 "Building the Foundation," *History of Kodak*, Eastman Kodak Company, http://www.kodak.com/ek/US/en/Our_Company/History_of_Kodak/Building_the_Foundation.htm.
- 19 *Ibid.*, p. 32.
- 20 Jenkins, *Images and Enterprise*, p. 158.
- 21 Smith, "The Saga of the Mystery Bull's-Eye."
- 22 "United States v. Eastman Kodak Company," *Federal Reporter*, vol. 226, November–December 1915: p. 69.
- 23 Brayer, *George Eastman, a Biography*, p. 189.
- 24 Jenkins, *Images and Enterprise*, p. 159.
- 25 *Ibid.*, p. 145.
- 26 Smith, "The Saga of the Mystery Bull's-Eye."
- 27 Marder and Marder, *Anthony*, p. 368.
- 28 Jenkins, *Images and Enterprise*, p. 190; *Anthony's Photographic Bulletin*, December 1895, p. 393.
- 29 Jenkins, *Images and Enterprise*, p. 190.
- 30 *Ibid.*, p. 190.
- 31 "United States v. Eastman Kodak Company," *Federal Reporter*, p. 70.
- 32 Brayer, *George Eastman, a Biography*, p. 190.
- 33 *Ibid.*
- 34 Brian Coe, *Kodak Cameras: The First Hundred Years* (Hove, England: Hove Foto Books, 1988).