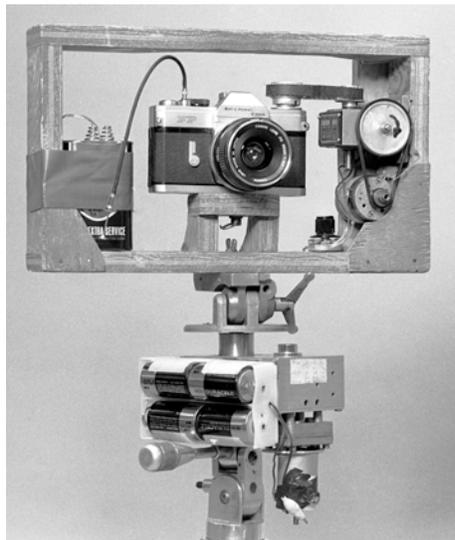


PANORAMIC CAMERAS I'VE MADE

Andrew Davidhazy, Imaging and Photographic Technology Rochester Institute of Technology

My experiences with panoramic camera construction started in the late 1960's while still an undergraduate student at R.I.T. and while involved with exploring the photographic possibilities of moving film type cameras generically known as "strip" cameras. I first learned of the pictorial applications of these cameras from the work of Life Magazine's George Silk and his coverage of the 1960 Olympics with a camera modified for him by Marty Forsher. The first panoramic camera I built consisted of a mechanism for rewinding the film in a standard 35mm camera while the camera was manually panned at a rate controlled by the focal length used on the camera. The longer the lens the slower the pan for a given rewind speed. I took an approach to determining the length of film required for a full 360° shot which was, and remains, rather unorthodox. Instead of using the traditional formula of $2 \times f \times \pi$, I divide the vertical angle of view of the lens in use into 360 and multiply this figure by 24mm. While normal focal length lenses require similar lengths by each method it was not until I came in contact with Cirkut photographers that the advantages of the previous method became evident.



Camera inventor has widest angle —360 degrees

By MIKE MEYERS

Students at the Rochester Institute of Technology have learned that 323 is a measure of imagination and hours of work can make for some pretty exciting strip pictures.

The 323 is for the camera equipment, set the model. And the model for the strip pictures can keep his or her clothes on.

The strip camera, also known as a streak or scanner camera, is being used by assistant professor Andrew Davidhazy to teach his students how inexpensive gadgets and a bit of tinkering can literally broaden the horizons of an ordinary camera.

A strip camera, for instance, can sweep 360 degrees and take a panoramic photo of everything in sight and expose it on to one negative, Davidhazy said.

Or, the same type of camera can adapt for strip pictures that freeze action. A strip photo may not show a model's curves, but they are constantly used to show the forms of little films at Aguedact. That is, to provide the photo flash, he said.

Davidhazy also has used the special camera to take bizarre, distorted portraits of people from all sides as subject rotates on a turntable.

The turntable idea isn't new. In the 19th Century, Davidhazy said, strip camera photographers would take pictures of Grecian urns and other art objects and send the photos to

exhibits in other countries, instead of the urns.

The way Davidhazy explained it, the way the camera is adapted is subtle.

The 35-millimeter camera shutter is replaced by a metal shield that lets in only a narrow strip of light, about a sixth of an inch wide and an inch long, that forms a vertical line on the photographic film.

An old sewing machine motor or similar motor is attached to the camera rewind knob with belts and the film is pulled past the slit of light much like a movie camera.

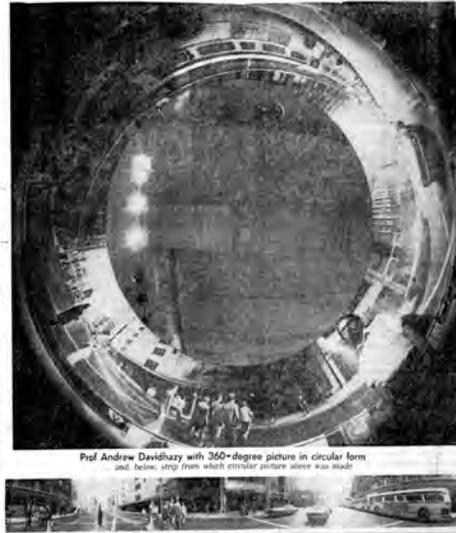
The motor can adjust to move at the same speed as the object in front of the camera lens, be it a person's body rotating on a turntable or a horse galloping to the finish line at a race.

Davidhazy, using equally inexpensive materials, built another camera out of plywood that allows the film inside the camera to turn on a motor-powered disk.

With the motor whirling the film at a speed of 17,000 revolutions per minute, the camera can record the path of a bullet fired in front of the camera lens, he said.

Strip cameras have practical applications in ballistics, industrial photography and even in map making.

With the film in a special strip camera set to move and compensate for the speed of a jet airplane, the Air Force a few years ago made a flight from New York to Caldeira with the strip camera focused on the ground.

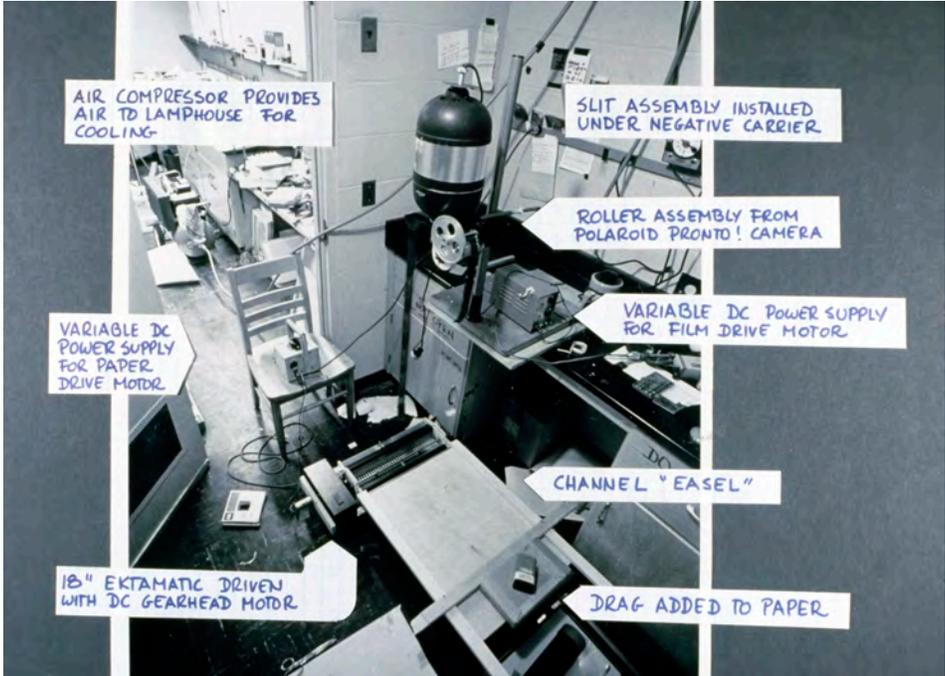


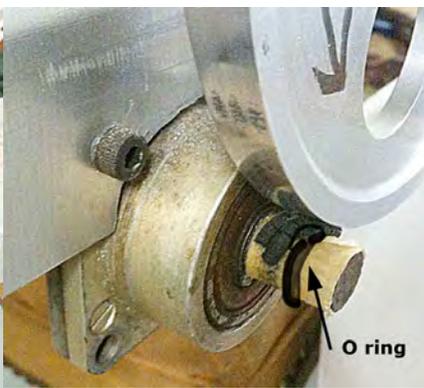
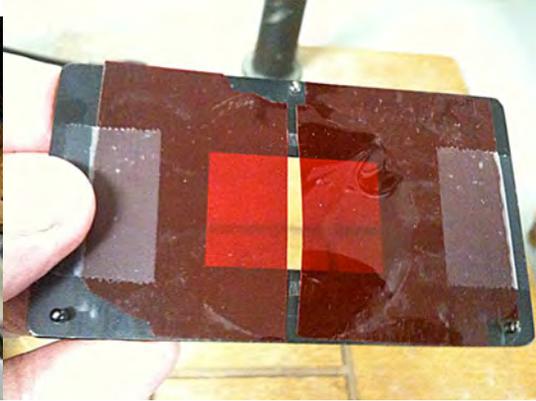
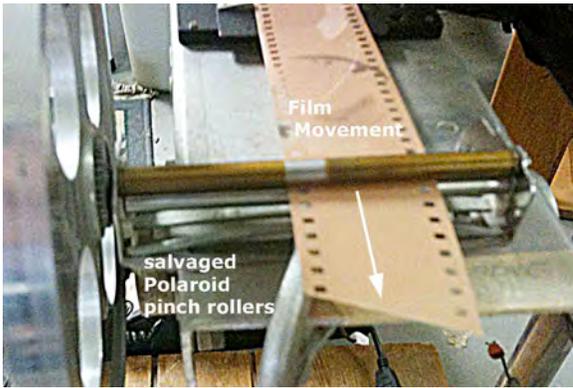
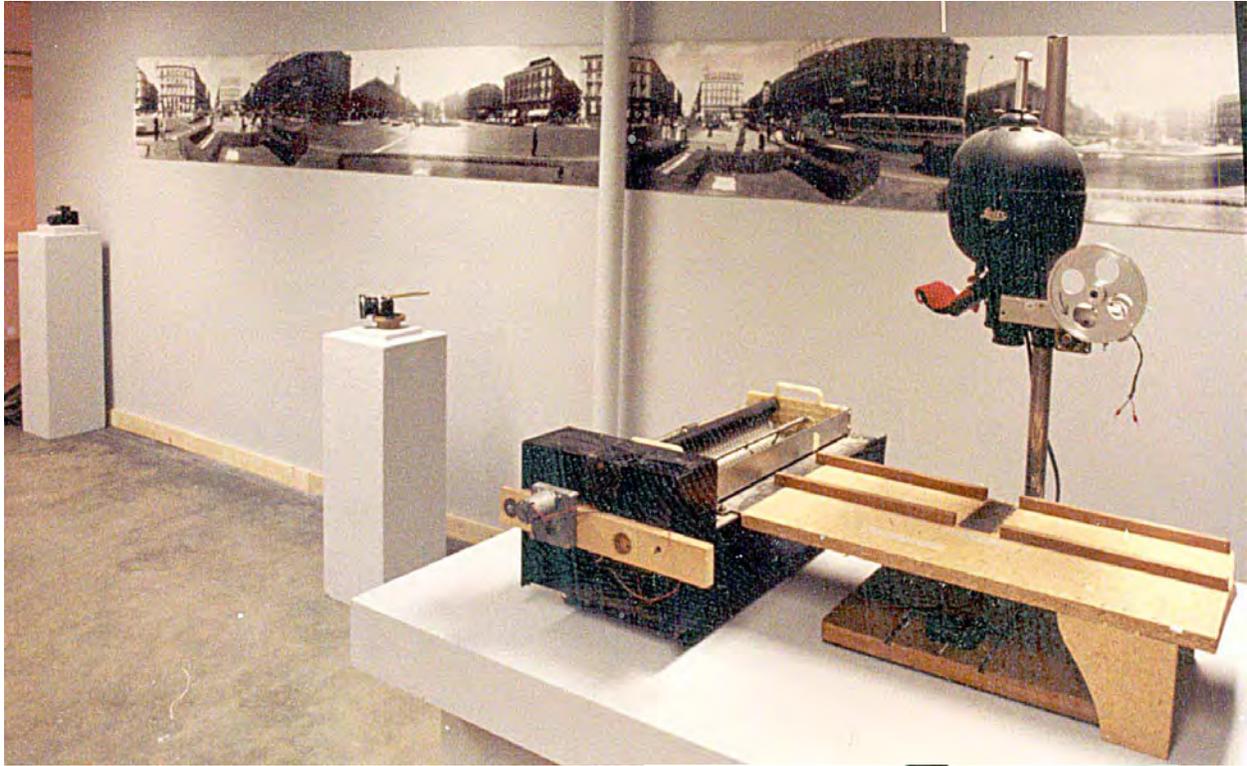
Prof Andrew Davidhazy with 360-degree picture in circular form and below strip from which picture above was made

At the same time that my interest in panoramic photography increased I started to experiment with enlargements. In 1970 I made a 360° 32 foot long print from a panoramic photography made with a 35mm focal length lens on the above camera turned by a battery driven rotating tripod head made for it. The print was made in two 16 foot sections projected by a masked down carrier in a 4x5 enlarger. It was 40 inches wide and when displayed it hung from a wooden hoop 10 feet in diameter under whose edge the audience had to "duck" in order to enter the city scene which was augmented by city sounds from a continuously repeating cassette recorder. My first experiments were published in the September 1969 issue of Popular Photography magazine.

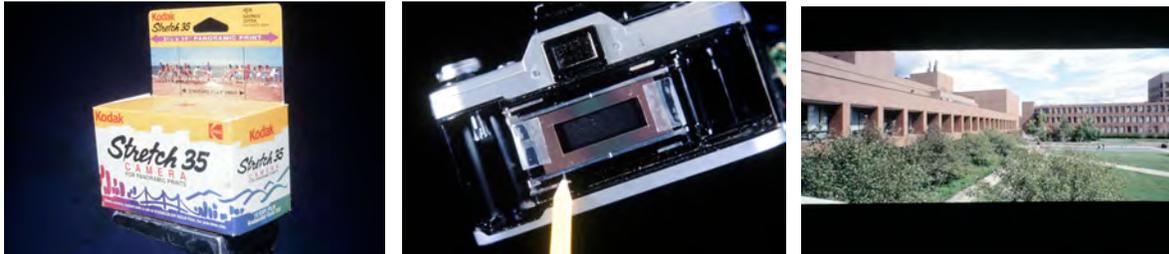


Subsequently I designed and built a "strip" enlarger capable of moving the film at the enlarger head and the paper at the easel. I motorized the drive rollers from a Polaroid Pronto camera to move the film and slowed down an 18" Ektamatic processor to drive the paper. Both the film and paper were driven by DC motors and I matched the speed of the paper to that of the enlarged image by simply varying the voltage to the paper drive so that the paper would appear to move at the same rate as the film's grain pattern. To easily visualize paper speed, I placed ink marks on the paper just previous to its passage past the image of the exposing slit at the easel. Soon I was making enlargements on 10" wide paper which exceeded 50 feet in length. I continued working in panoramic and other applications of "strip" type cameras and my activity was reported again in the June 1980 issue of Modern Photography.





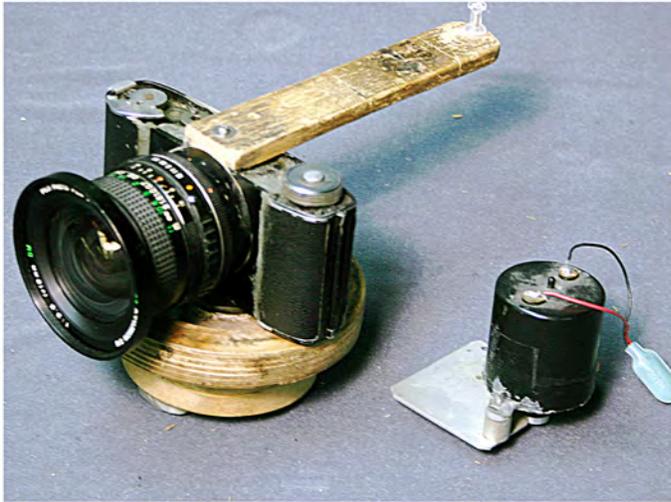
Kodak got into the act of panoramic photography by producing a simple point and shoot camera that claimed panoramic status but in fact was nothing more than a standard 35 mm camera which had its focal frame masked down to a 12x36 mm opening. The viewfinder was made to have a 1 to 3 aspect ratio. I thought I would mimic that arrangement with my standard camera and installed a mask at the film plane and produced results as shown here. In reality the camera would not have had to be modified as a full frame negative could be cropped at the printing stage. So was the camera “panoramic”? Subject of debate!



At one time I acquired several Nimslo camera when they were being dumped on the surplus market. I saw the potential of the camera to be turned into a fixed lens panoramic camera by removing the septums within the body and attaching a lens with sufficient covering power to cover a frame that is about 22x74 mm in size. I found that a medium camera standard lens would do it. So after “cleaning out the inside I replaced the front standard with a single 75mm focal length lens from a Yashika camera. I adjusted the depth of the wooden spacer glued to the camera so that the lens would be able to focus at infinity when fully pushed into the round hole drilled into the spacer. Focus was adjusted by making several tests and marking the lens barrel with scratches to indicate various distances that corresponded with increasing the distance of the lens from the film plane. I did this adjustment using a groundglass at the film plane guide rails. Modified in this manner the Nimslo II will give you pictures with an aspect ratio of about 1:3.5 rather than the normal 1:1.5 of standard 35mm cameras.



As a result of the article in Modern Photography article I received a letter from Alan Zinn of Michigan who issued sort of a challenge by starting that he had designed a camera that used no motors or gears. The photographs he sent me were very good indeed! I decided to look into alternate designs as a result.



The outcome was a camera that at least partially met the challenge. I modified an Agfa Silette body by fitting it with a 19mm Canon lens adding a rubberized wheel to its film advance shaft. This external wheel contacted the inner surface of a circular depression out into a wooden base with a lathe. The diameters of the camera wheel and the cylindrical depression within which it rode were proportional to the circumference of the film advance sprocket and the amount of film which the 19mm lens required for a complete panoramic photograph.



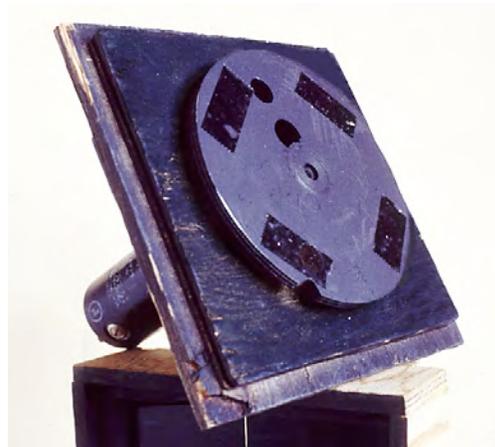
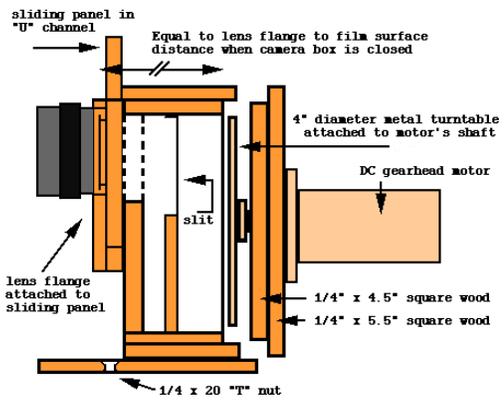
Given that the location of the tripod socket of the camera (the point about which the camera rotated) and the shaft of the film advance sprocket were fixed, only one set of wheel/circle diameters would allow the two to continually remain in contact as the camera turned. Thus, turning the camera also advanced the film and during one 360° revolution exactly $19 \times 2 \times \pi$ or 119mm of film passed through the camera. Since the slit was fixed at 1 mm, the exposure time was always a function of how fast the camera rotated.



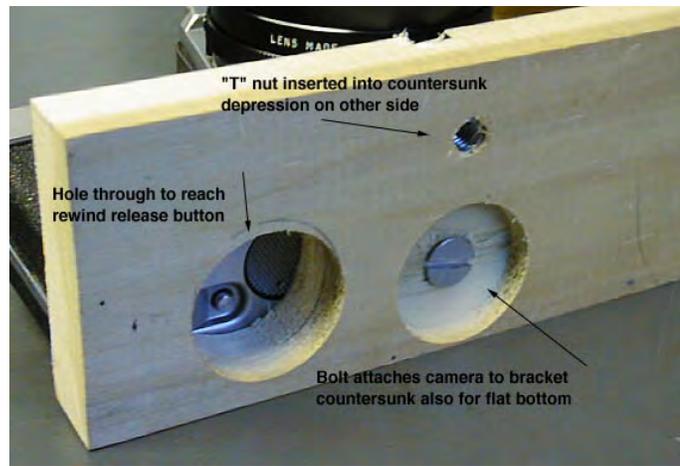
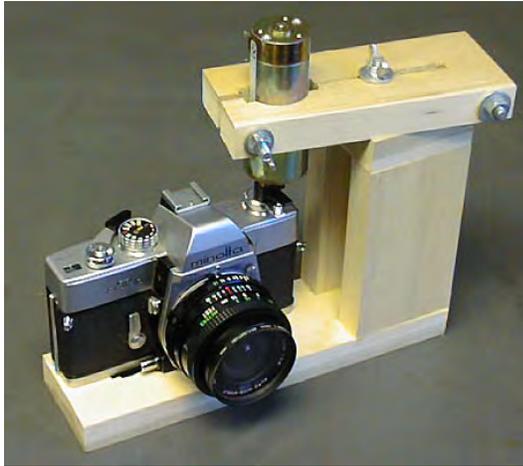
I have used this camera ever since and presently it is further modified with a rising and falling lens mount so that the horizon location can be placed as close as 2mm from either edge of the negative. That is, the lens can be raised or lowered 10mm off axis. The camera has been a lot of fun to use and even though it is capable of being motor driven, it is most fun to use when I turn it by hand and get myself included in each panoramic photograph.

A recent development, which was reported at a IAPP meeting in Las Vegas, is a novel panoramic camera in which the film traverses a circular path rather than moving in straight linear fashion as in standard panoramic cameras. It came about due to a problem that some Cirkut camera users reported when using the "Goldbeck wedge". They complained that the resulting photographs were not equally sharp from top to bottom of the film. I was also trying to find a solution for photographing conical subjects in the peripheral or roll out mode. I was asked by the Dansk Corp. to produce copies of the surface of a conical teapot. In both instances the image velocity along the slit of the camera moves at different rates. One day while driving along I realized that in order to cope with the situation the film would have to move at a different rate at one end of the slit shutter than the other. I realized this could be achieved by rotating the film instead of passing it by the slit in linear fashion. It took me a week or so to make the camera that is still useable today.

So this "conical" panoramic camera is able to deliver 360° photographs in which the top is slightly shorter than the bottom thus allowing a print to assume a conical, rather than cylindrical, shape. The images produced by the camera can be used directly as conical lampshades, novelty hats or any other conically shaped article on which it is desired to show a full undistorted panoramic view.



Throughout my work in the area of strip cameras it has always been my intention to develop systems which the amateur could experiment with without altering or ruining expensive personal equipment.



With this in mind, I finally designed this simplified re-winding bracket which can be built with simple hand tools at a minimum of expense. This bracket, to some extent resembling a \$400 Sugawara Film Streak V re-winding bracket which used to be available from Japan, will allow most any photographer to explore panoramic, peripheral, photofinish and a variety of other applications in the exciting field of "strip" photography.

I have designed, modified and constructed several other cameras intended for a variety of applications, from peripheral or roll out photography (some call it slit scan), high speed photography, stereo photography, etc. I hope to compile an article similar to this one which is a compilation of cameras and panoramic photography applications. Date: January 12, 2021

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