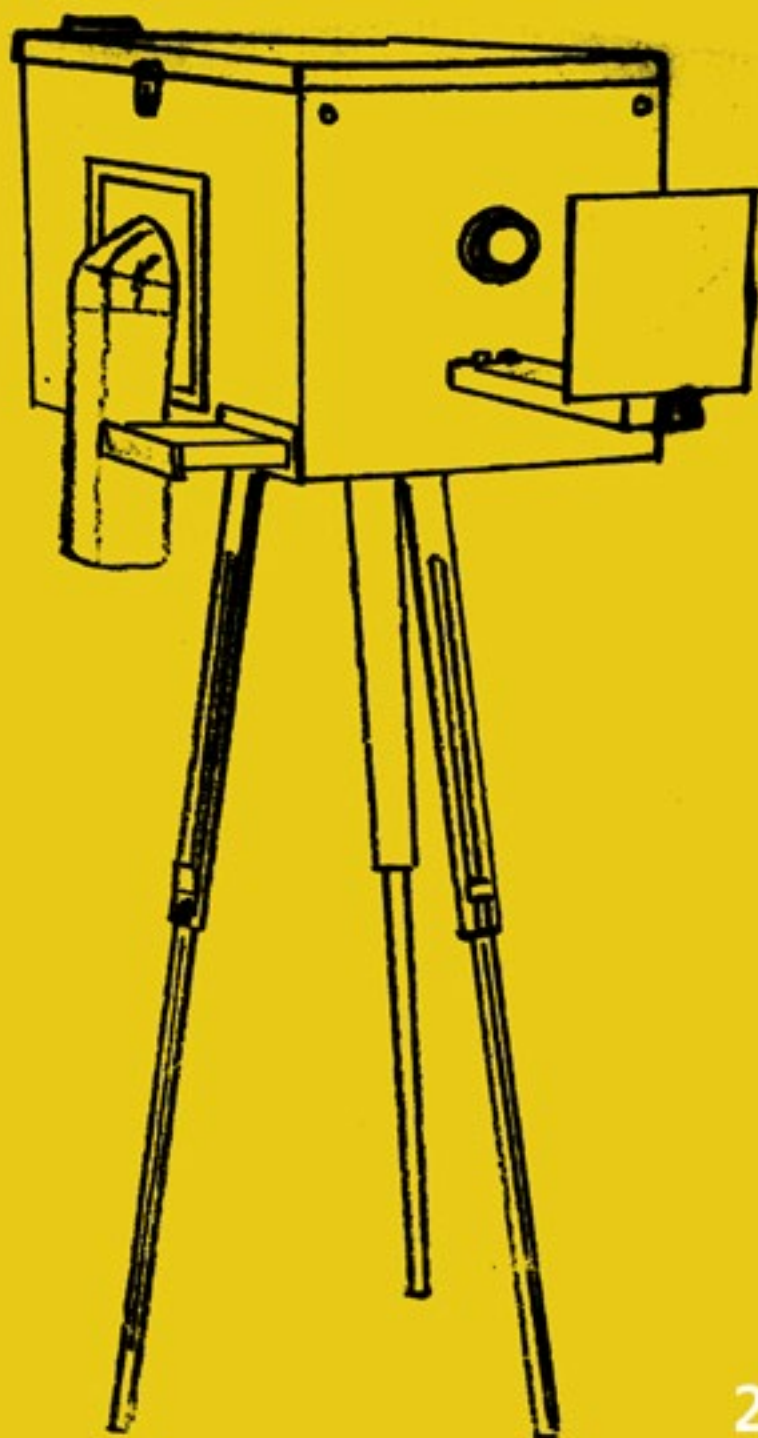


# HOW TO BUILD A KAMRA-E-FAOREE



2012 UPDATE



## **The Afghan box camera project**

The aim of the Afghan Box Camera Project is to provide a record of the kamra-e-faoree which as a living form of photography is on the brink of disappearing in Afghanistan.

On our website [www.afghanboxcamera.com](http://www.afghanboxcamera.com) you will find instructions on how to use a kamra-e-faoree, general background information on the camera and photography in Afghanistan, a variety of photo-galleries and photographer portfolios, and links to resources. We also delve just a little into large format photography in Afghanistan and hand-coloured portraits.

The project is the work of Lukas Birk and Sean Foley, and we happily invite others to join with us to help document this vanishing livelihood and art form.

You can contact us by email  
[contact@afghanboxcamera.com](mailto:contact@afghanboxcamera.com).

## **How to make an Afghan box camera?**

The box camera is a simple light-tight wooden box with a photographic lens. Light is focused via the lens onto photographic paper on the inside of the box; this paper is mounted on a moveable glass plate used for focusing the image. After the paper is exposed to light it is first put into the developing chemical and then the fixer; these are found in two separate trays inside the back of the box. Once the paper has been immersed in the fixer, the box can be opened and the negative of the image taken will be visible. This negative will then be mounted in front of the lens, and the same process will be applied to photographing the negative, only now a positive will be visible on the developed paper.

### **First of all:**

Just like photography, building a box camera is not rocket science. There are a few elements which have to be carefully executed but for the most part it is easy and not very exact. Obviously the more precise you work and the bigger your understanding of the topic the easier it will be to take good photographs.

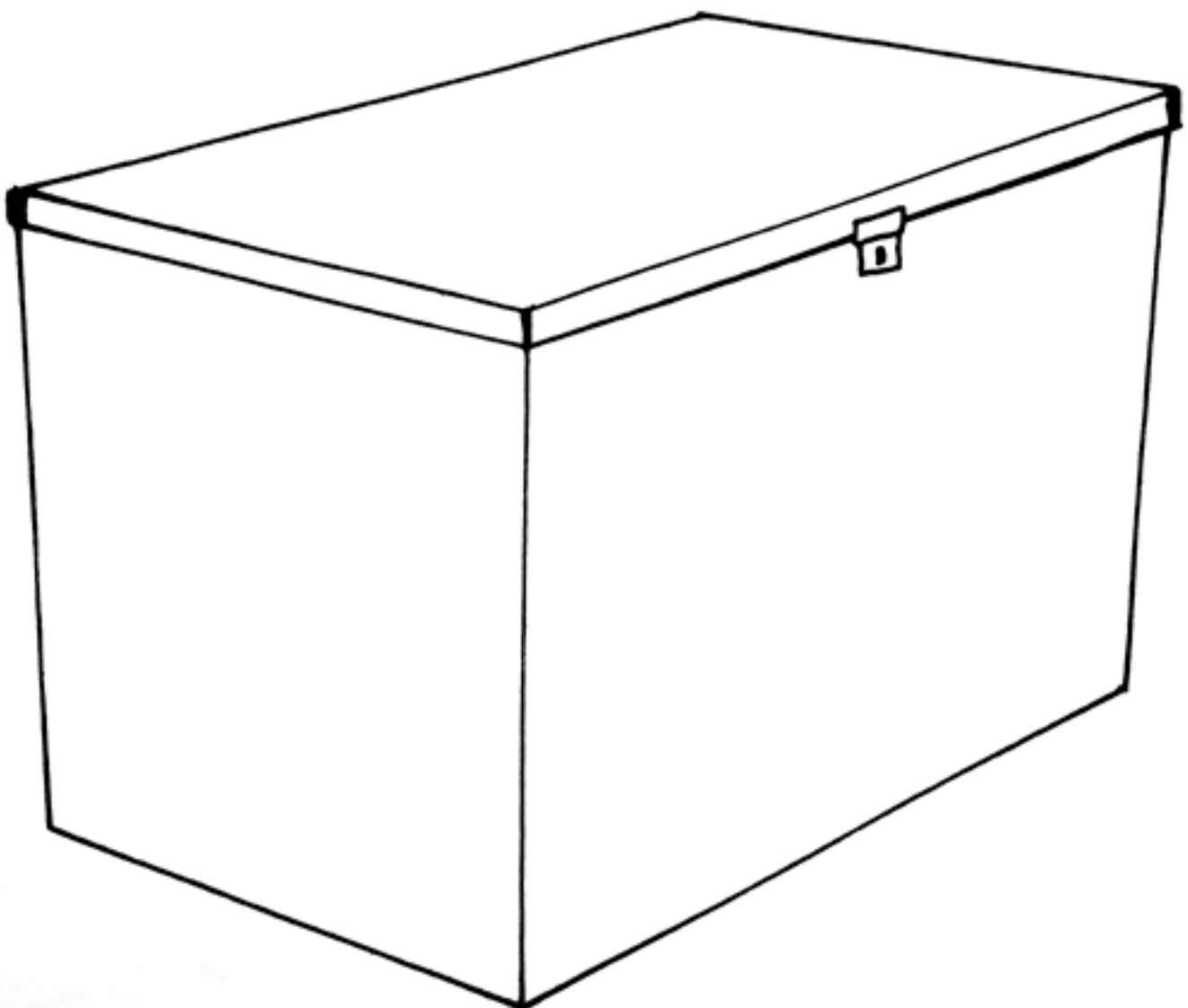
### **Cover and protection:**

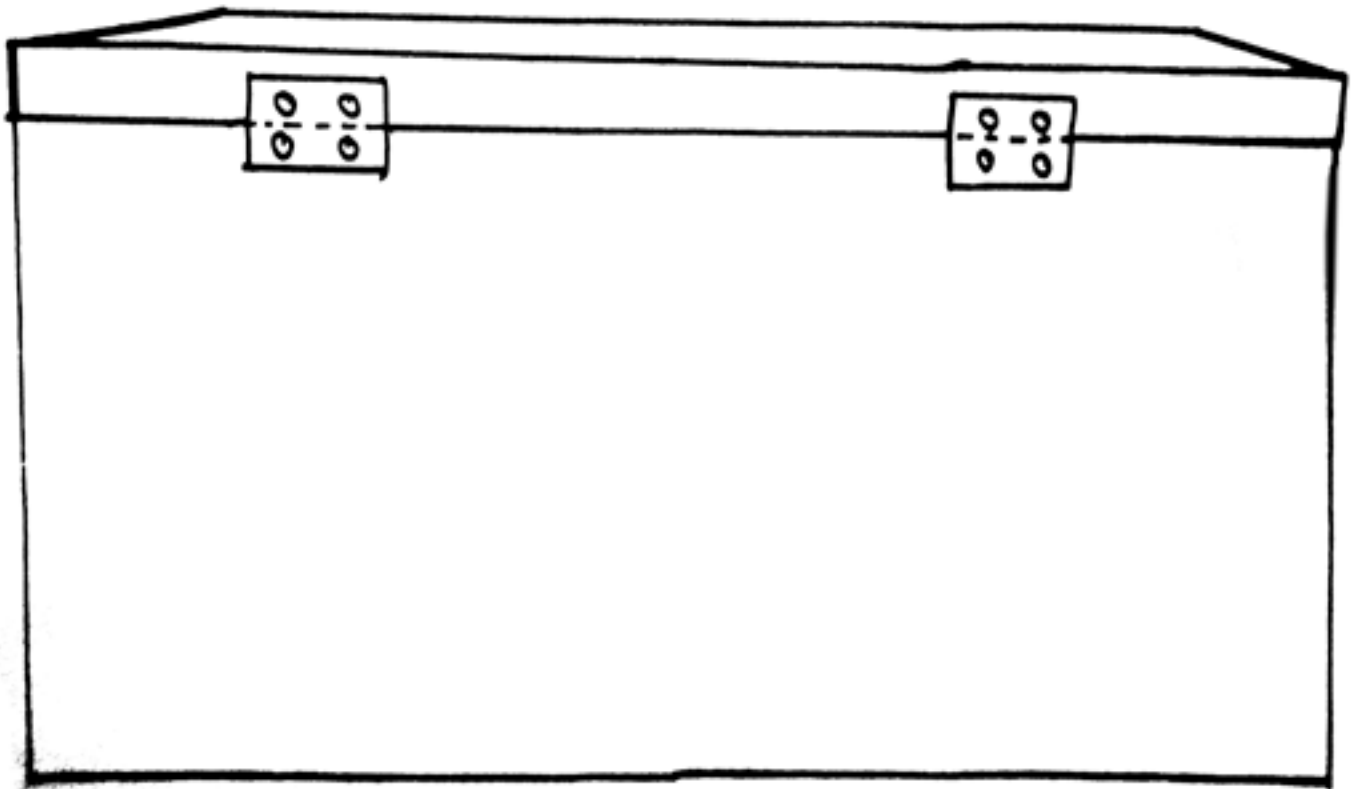
In order to protect the wood and make the camera more resistant the carpenters either covered the camera with a vinyl fabric or applied thick layers of paint on all sides of the box and the tripod. They also use various materials to protect the corners of the box.

## The Box:

The box should be 50cm in length, 30cm in height, and 30cm wide. If the box is bigger it will be easier to place all your materials inside but more difficult to carry around; it also makes balancing the box on the tripod easier. All the measurements below are for a 50x30x30cm (19.5x11.8x11.8 in.) size box.

**Compact model:** Compared to the models we found in Kabul, we came across a substantially smaller camera in Herat as well as Mazar-e-Sharif, typically measuring approximately 36x28x28cm (14x11x11 in.).





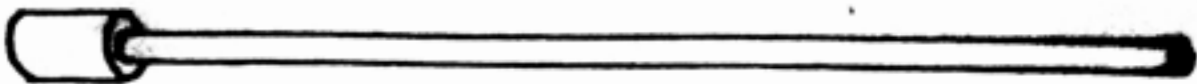
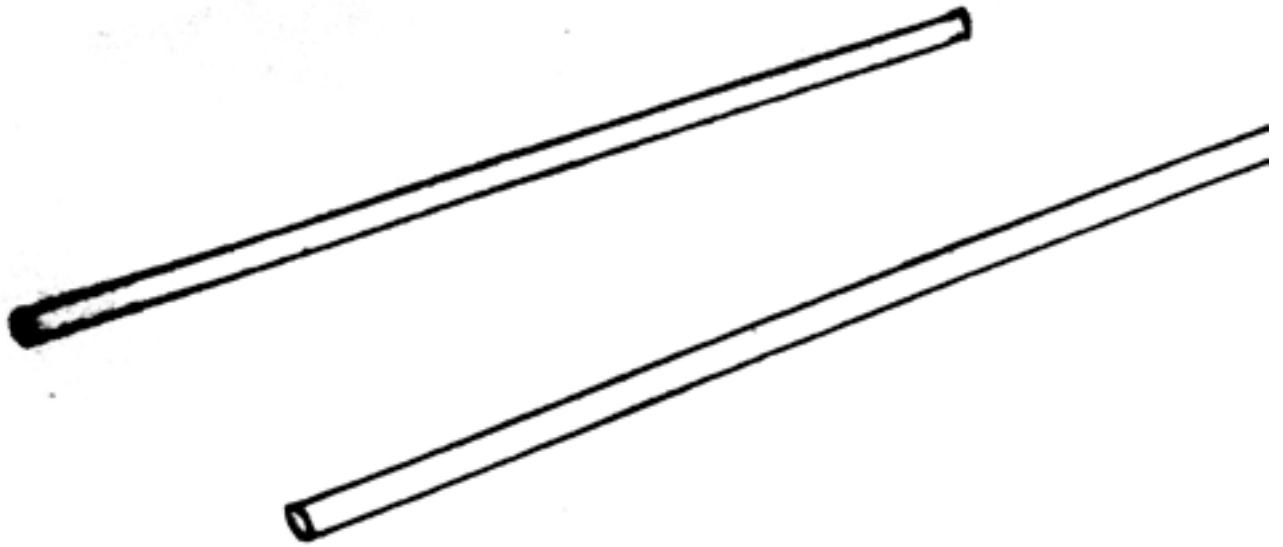
You have to be able to open the box to get inside, so make sure to have good hinges in the back and some sort of locking mechanism in the front.

**Very important!** The box needs to be light-tight as the photographic paper requires absolute darkness (except for red light) otherwise you won't be able to take a picture. The floor part of the box should be stable as you will need to put chemicals and photographic paper inside. The floor should also be flat otherwise you will spill the chemicals. In addition, you will you need to screw a tripod mount into the floor. For this the floor should have at least 5mm - 1cm (0.4 in.) thickness. If the material of the box is not thick enough you can also construct a platform between the tripod and the box - but information on that will be provided further down.

## Rods:

You need three metal rods each with a length of 50cm and a diameter of about 1cm (0.4 in.).

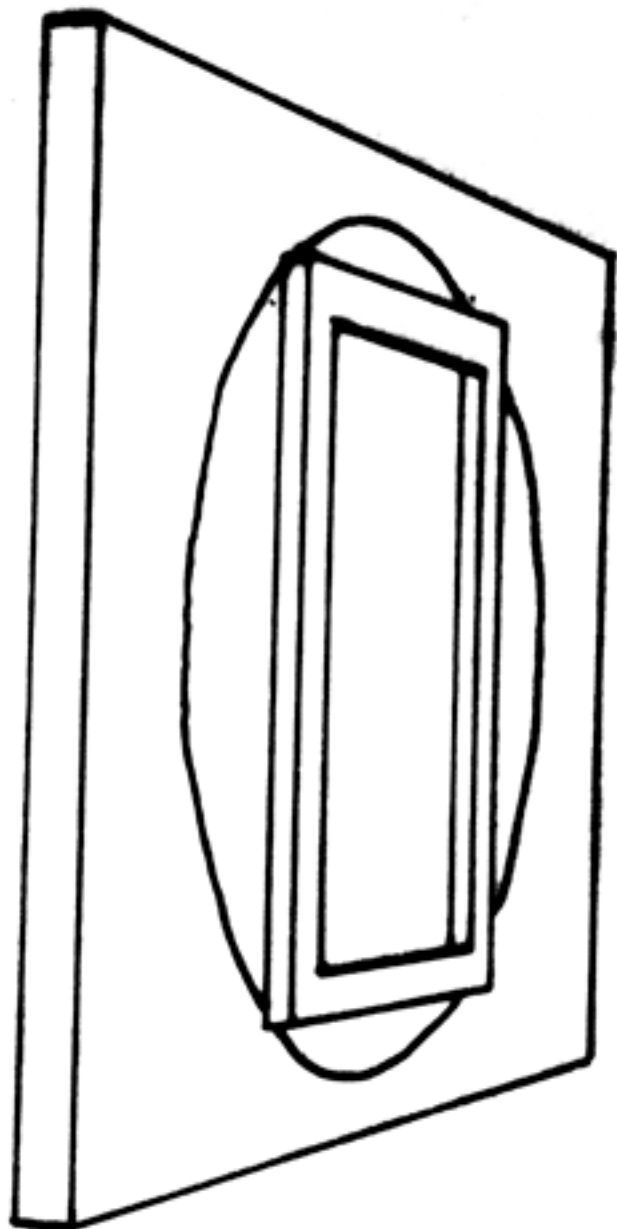
One of these rods should have some sort of handle on one end to pull and push. In the illustration we put a round piece of wood at the tip of the rod. The two plain rods are used to stabilize your focusing plate and the rod with the "handle" on one end will be your focusing rod connected to the focusing plate.



## **Focusing plate:**

The focusing plate is located inside the box and connected to three metal rods. To make sure the plate is stable and can be moved steadily we suggest you make it out of wood. It should measure 27cm (10.6 in.) in width, 21cm (8.2 in.) in height and about 1cm (0.4 in.) thick.

In the center of the wooden plate is a glass on which you put the photographic paper. This doesn't need to be real glass; it could also be Plexiglas or an acrylic board. In the illustration the glass plate is mounted on a round rotatable board and fitted onto the focusing plate. This is an extra feature which will allow you to rotate the glass plate in vertical position for portraits or horizontal position for landscape and group photos.

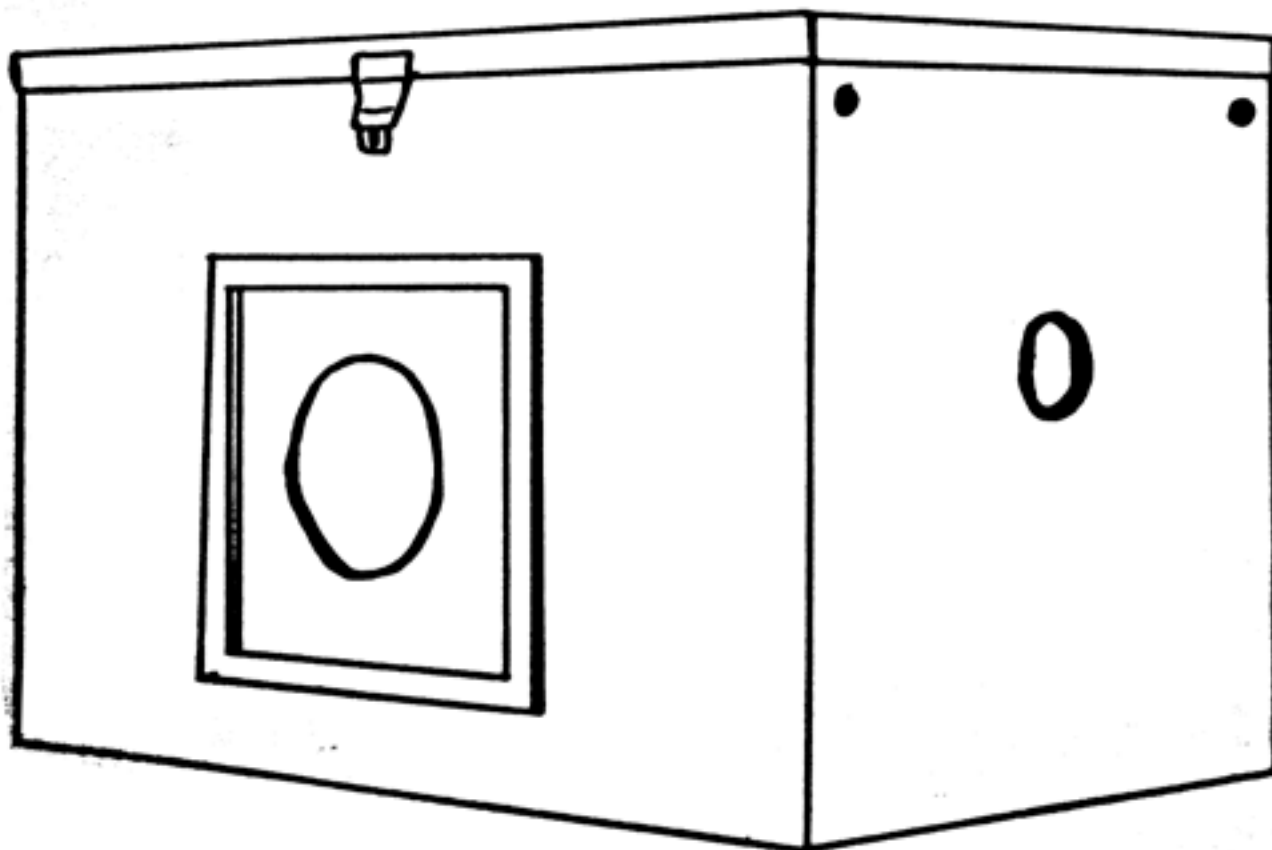


## **Lens hole:**

The front requires a hole the same size as your lens. Depending on what lens you use it might be up to 8 cm in diameter. This hole should be aligned with the centre of the focusing plate.

## **Arm hole:**

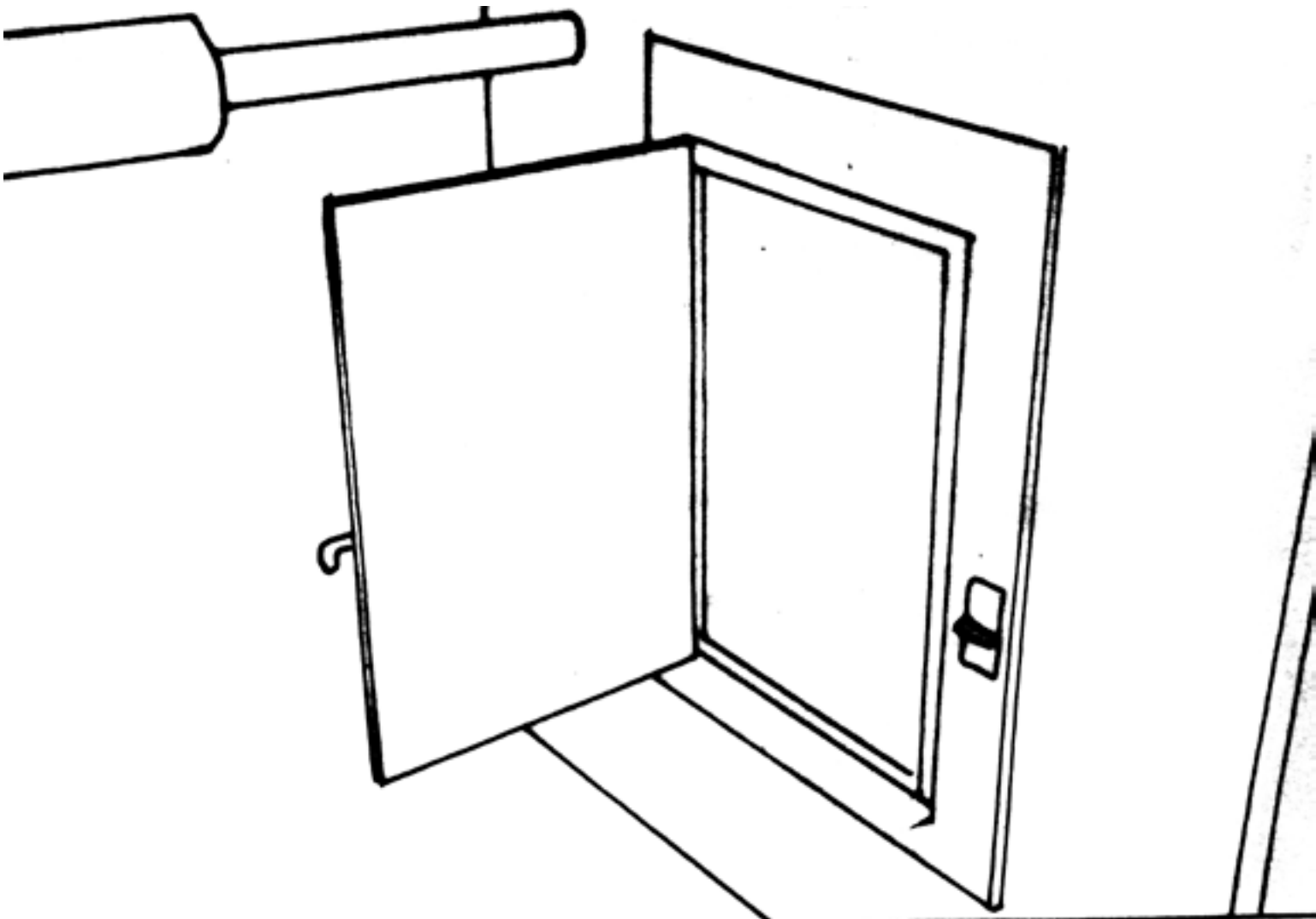
The hole on the side is through which you later access the paper and chemicals with your arm. It should be between 8cm to 10cm (4 in.) in diameter. In our illustrated example there is a little door made around the side hole. This is an extra feature which allows you to put your chemicals and papers in and take them out through the side. It is not really needed as you can also do this via the lid of the box.





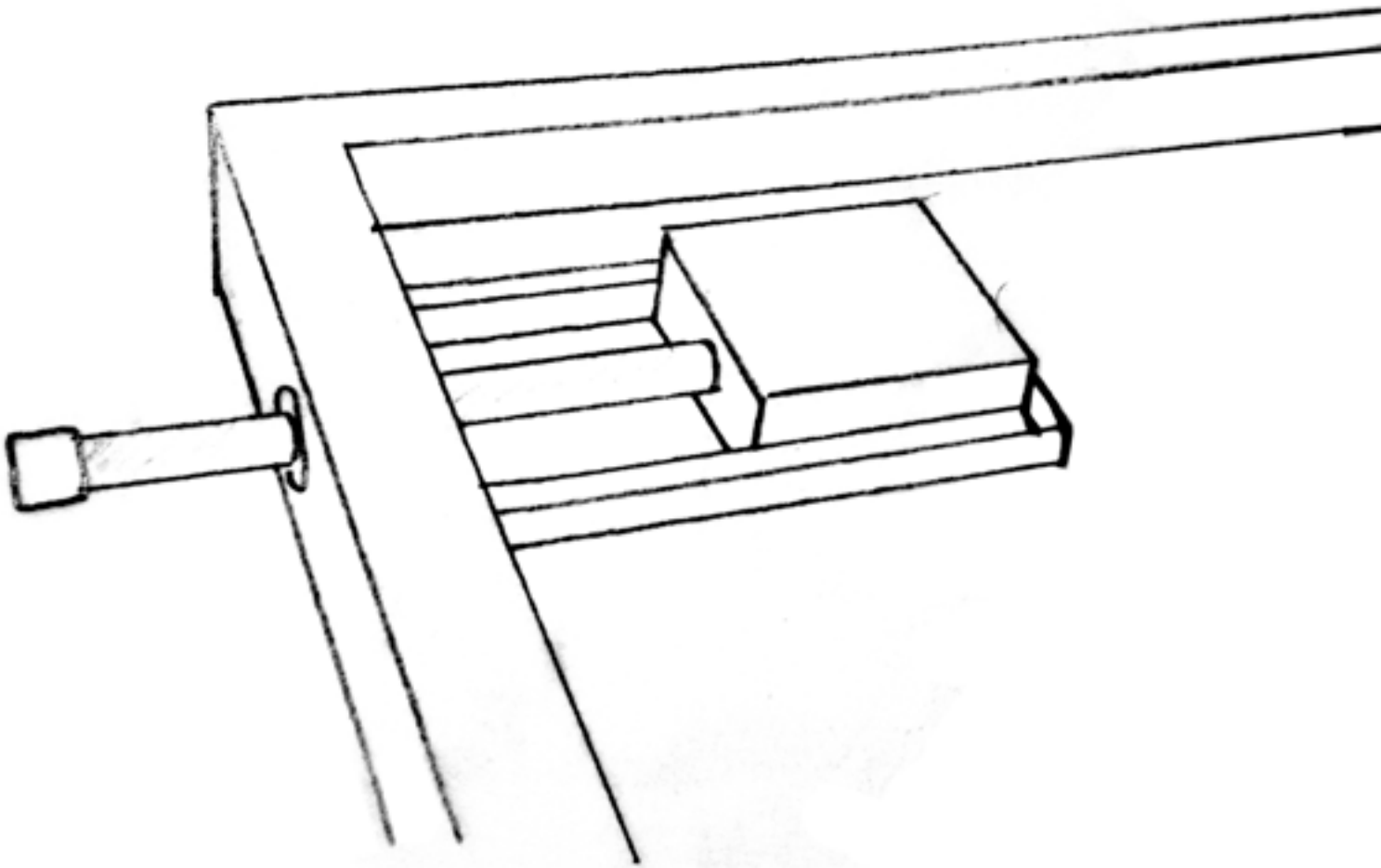
## Back door:

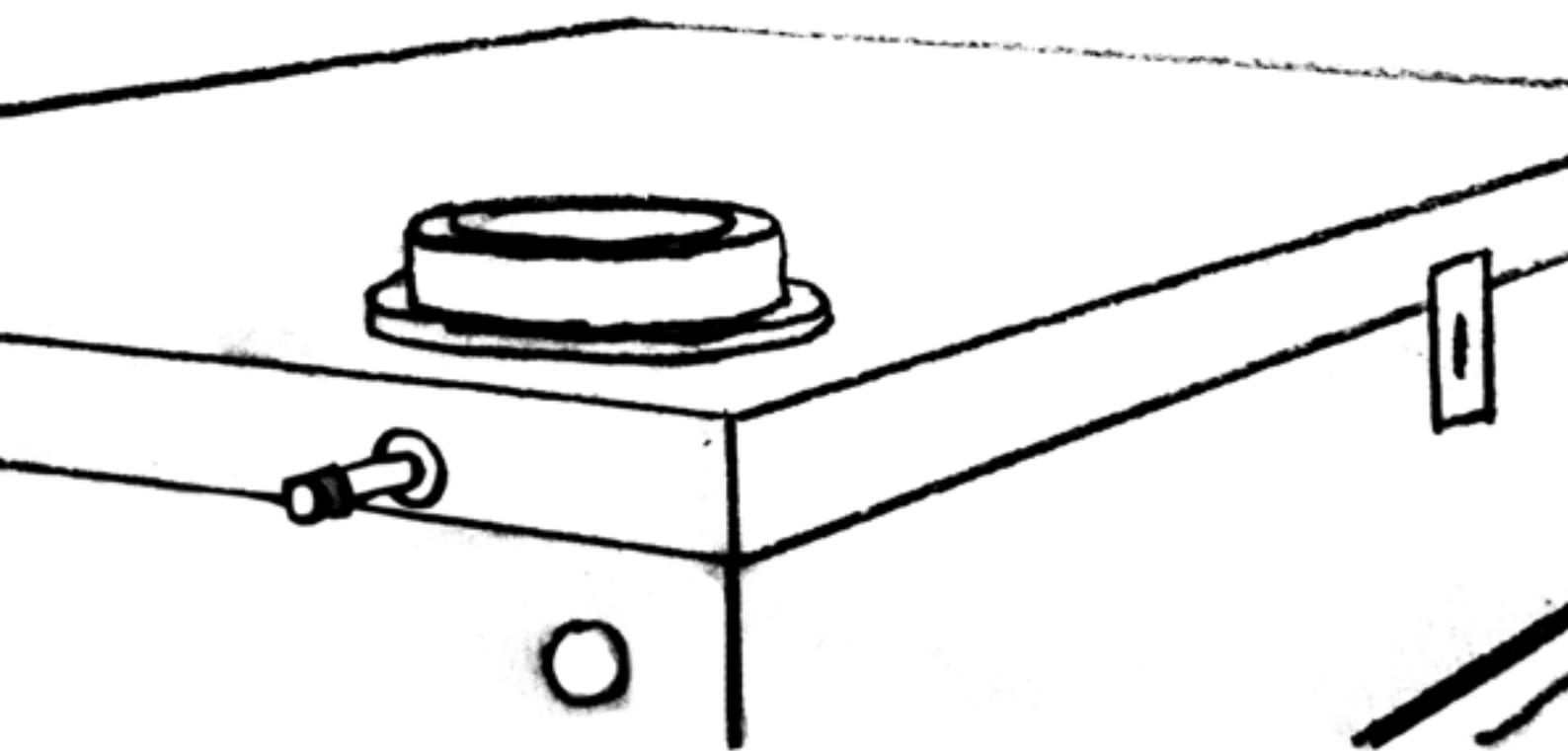
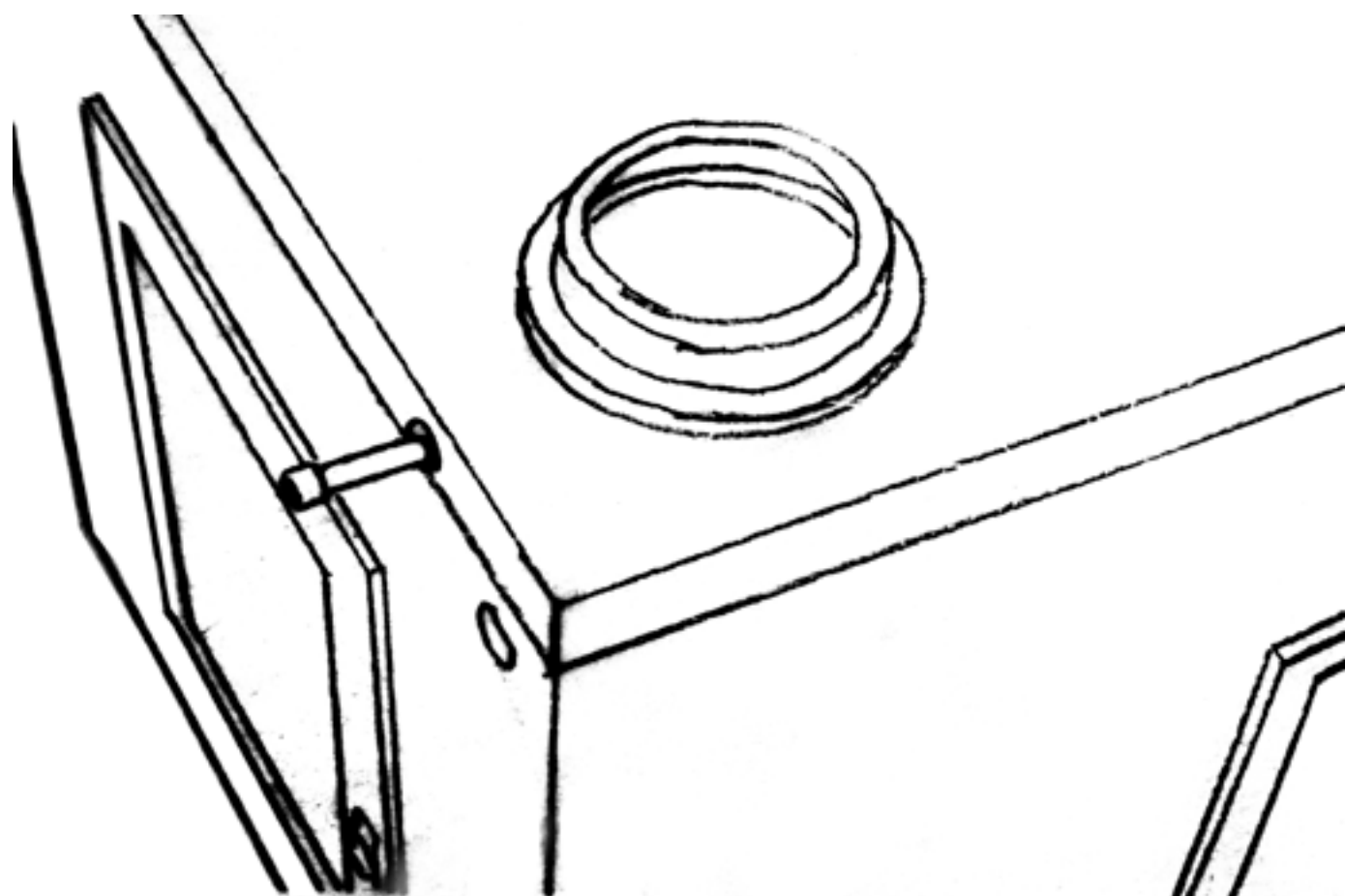
You will need to make a small lockable door in the back of the box. This will be your viewfinder later on. It doesn't need to be big. Around 8x12cm (3.1x4.7 in.) is enough. A part of the door needs to be cut out and replaced with red glass, plexiglass or simple red plastic. This will allow red light into the box which does not harm the photographic paper. This light is needed for you to check the developing process through the eye hole.

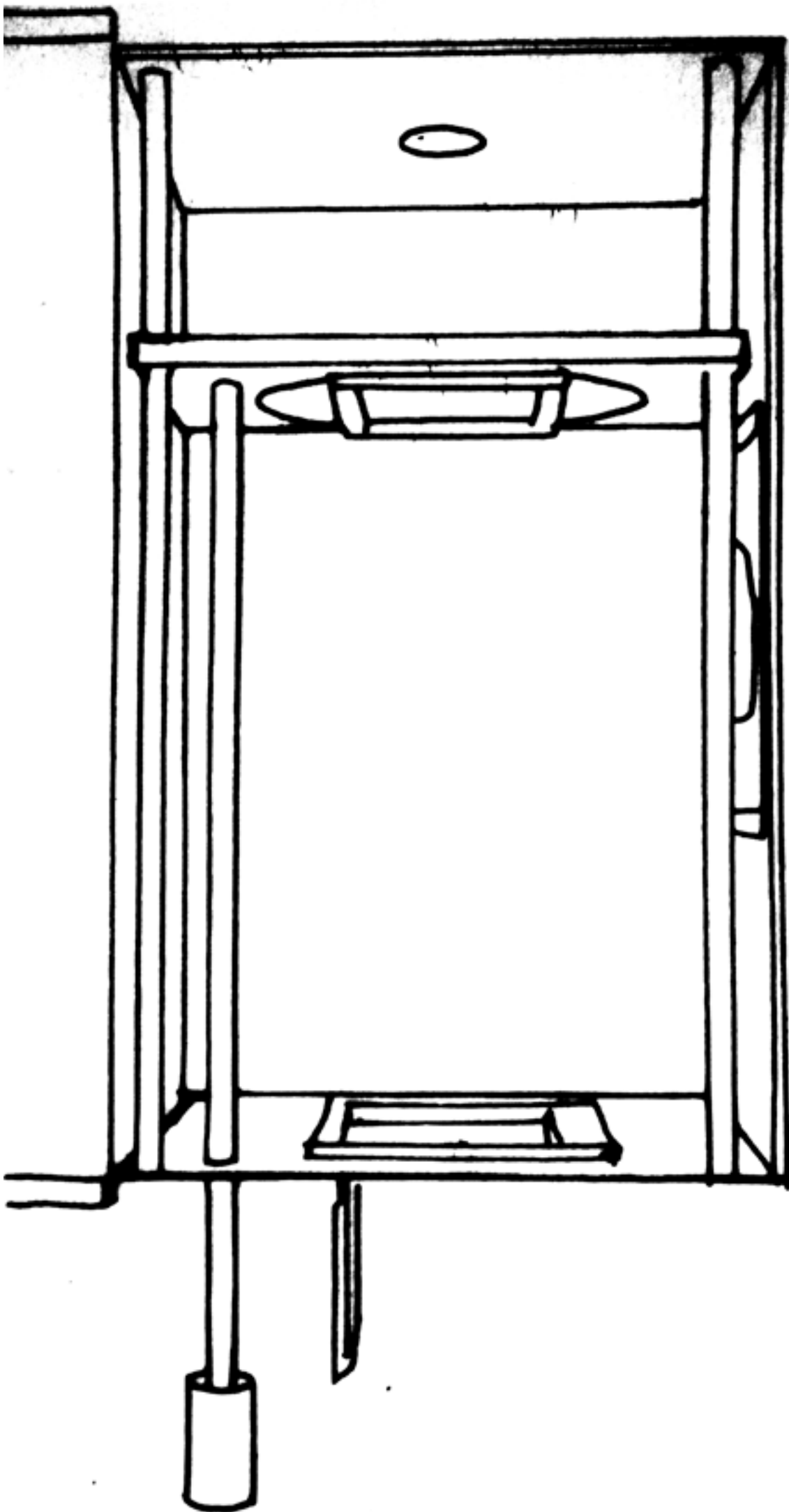


## Eye hole:

The eye hole on the top of the box allows you to check on the developing process of the photographic paper. It should be small, with the diameter not exceeding 4cm. On top of the hole you can put any kind of material on which you can press your eye and stop light from entering the box. There are many ways of covering the hole while you are not looking inside. In our example we use a small shutter attached to the inside of the lid. With a pin this shutter can be accessed from outside the box.

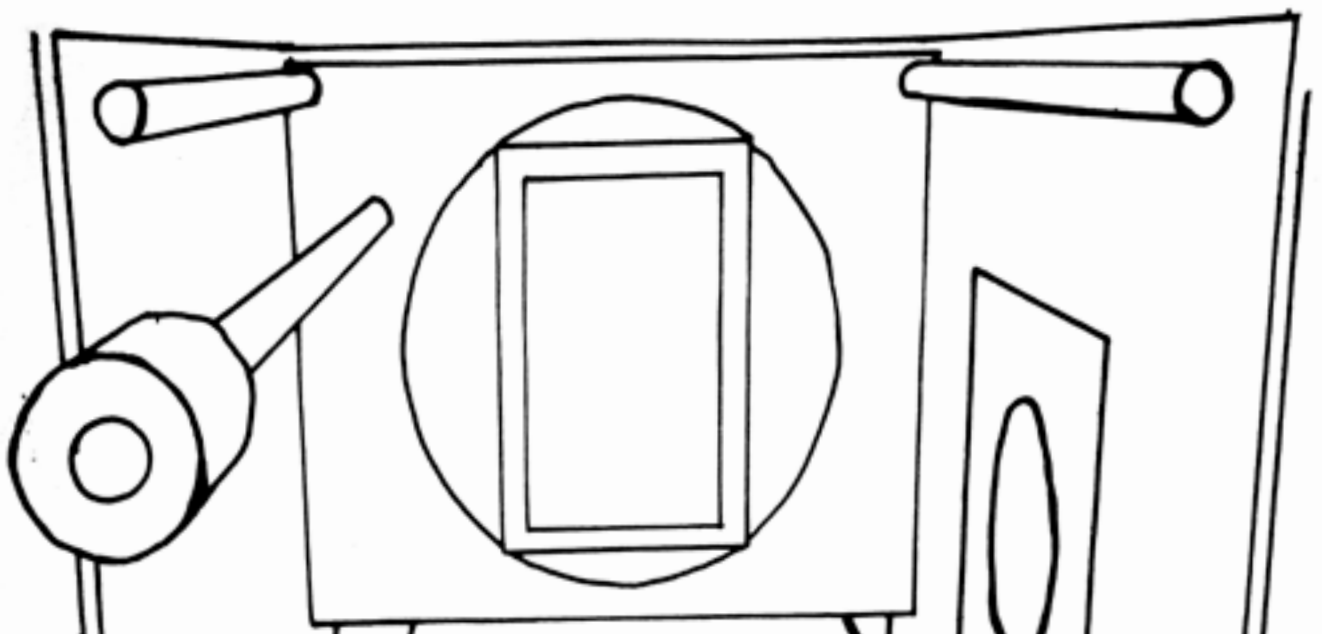


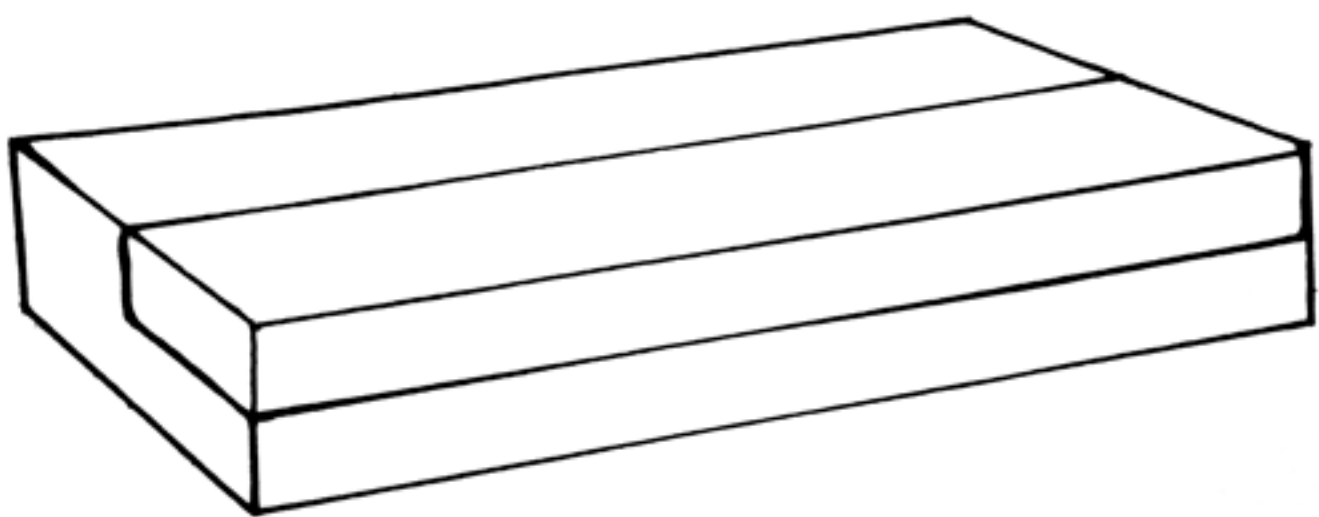
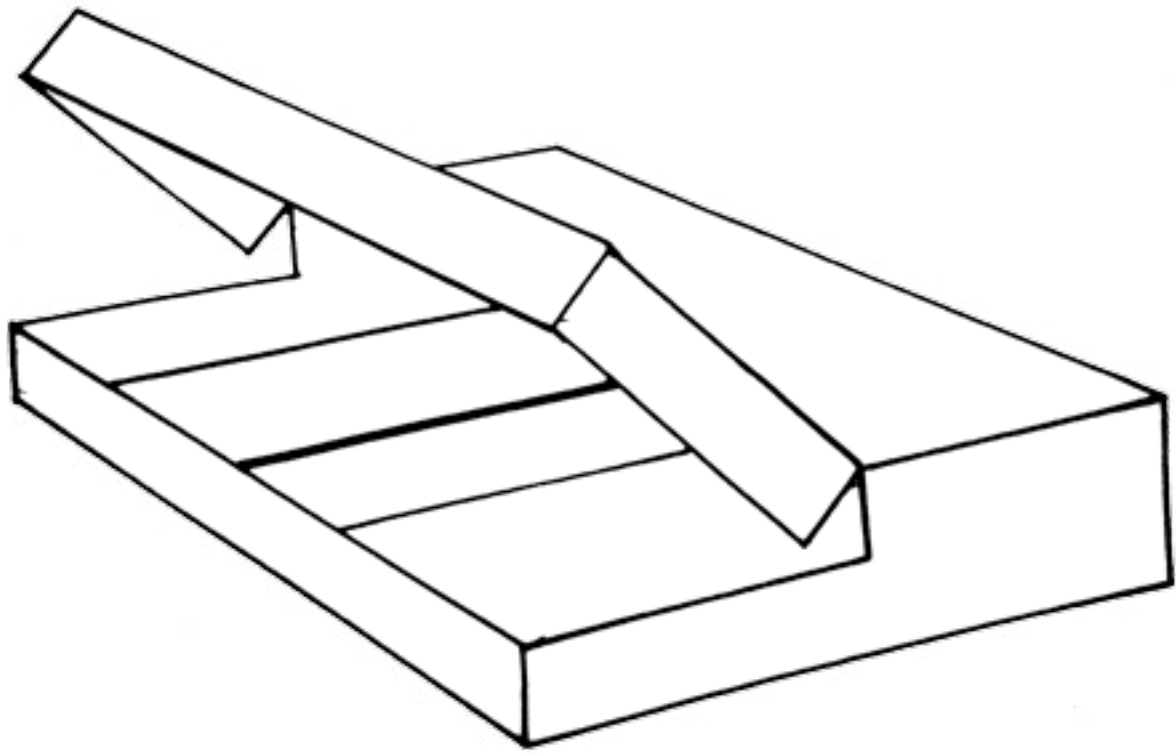




## Connecting rods and focusing plate:

The rods and the focus plate as seen in the illustration are now put together. The holes in the focus plate through which the rods are inserted should be a little bit bigger than the rods themselves so that you can easily slide the plate along them. The focusing rod is the only rod that is actually attached as a fixture to the focusing plate. This will allow you to move the plate from outside.





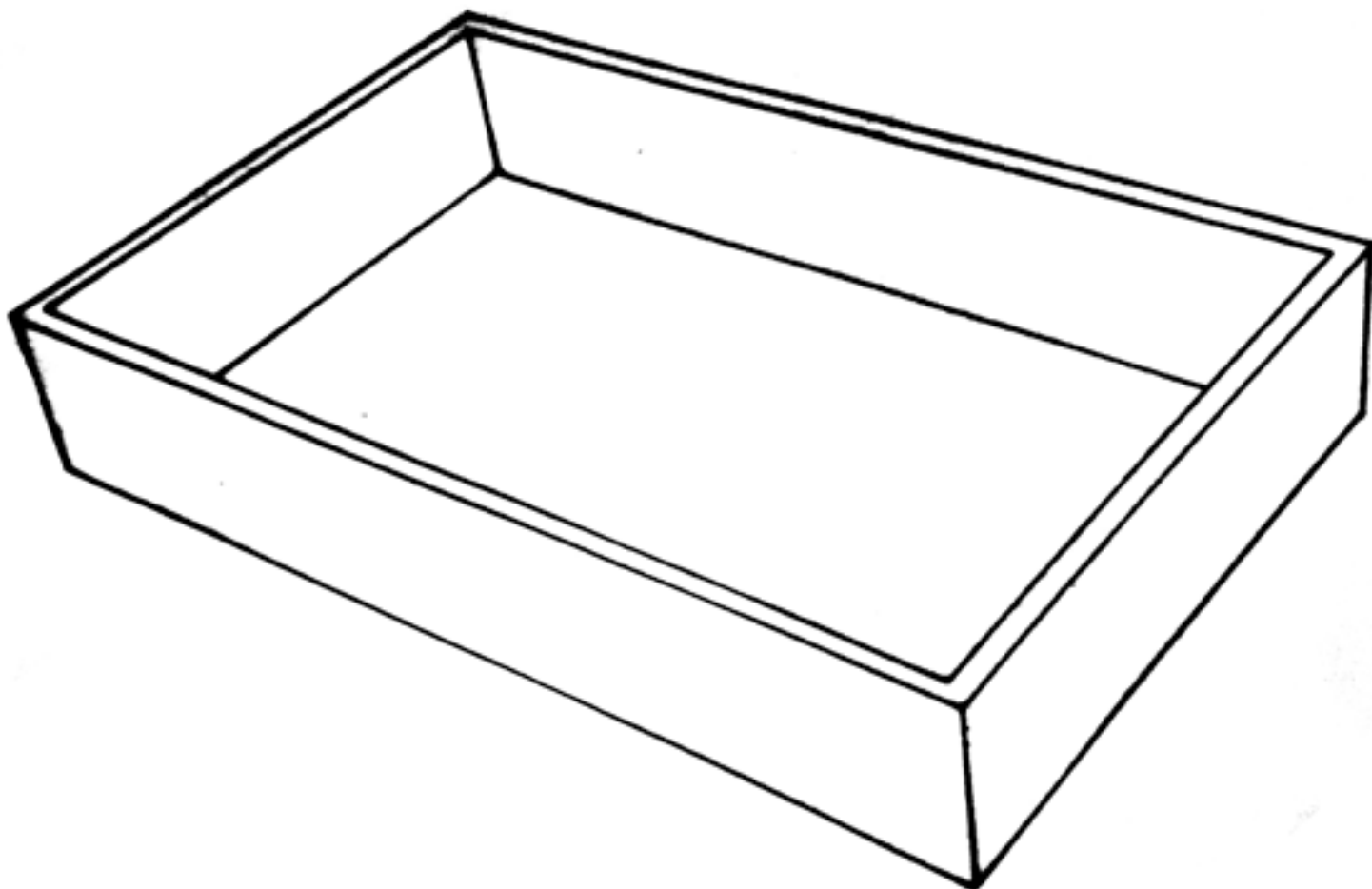
## **Paper box:**

It makes working a lot easier if you make your own customized paper box to fit the dimensions of your camera. This paper box has to be light tight and easy to open as you will access it with only one hand while the box is closed. The paper box should be able to fit under the focusing plate once the rods have been installed in the camera.

The box we used for our camera is 18cm (7 in.) wide, 12cm (4.7 in.) deep and 4cm (1.5 in.) high. It is also partitioned to store different sized paper, and can be made out of wood or cardboard or any other solid material.

## **Trays:**

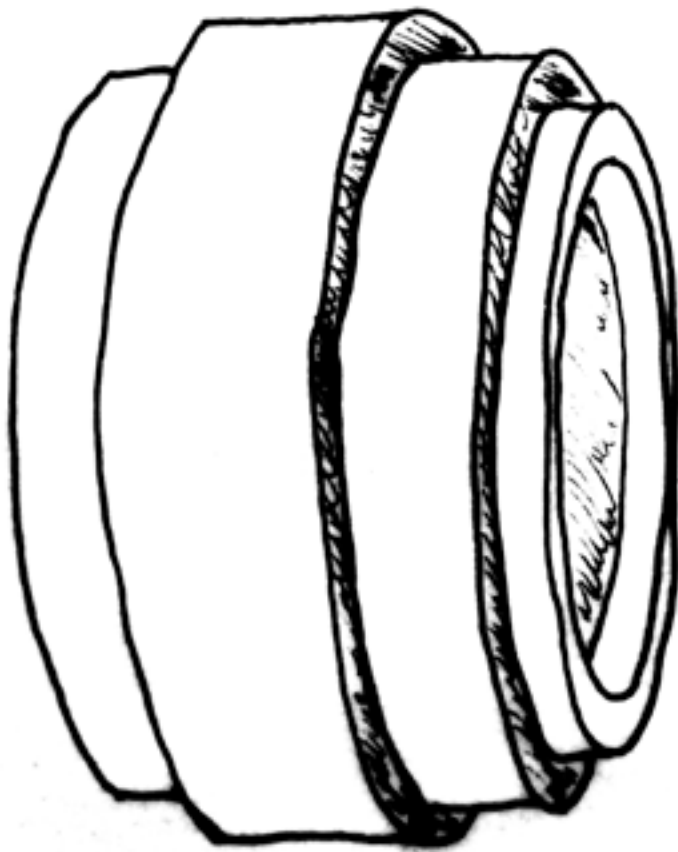
You will need two trays: one for the developer chemical and one for the fixer chemical. They can be big or small depending on how big your images will be. For example 10x12cm (4x4.7 in.).



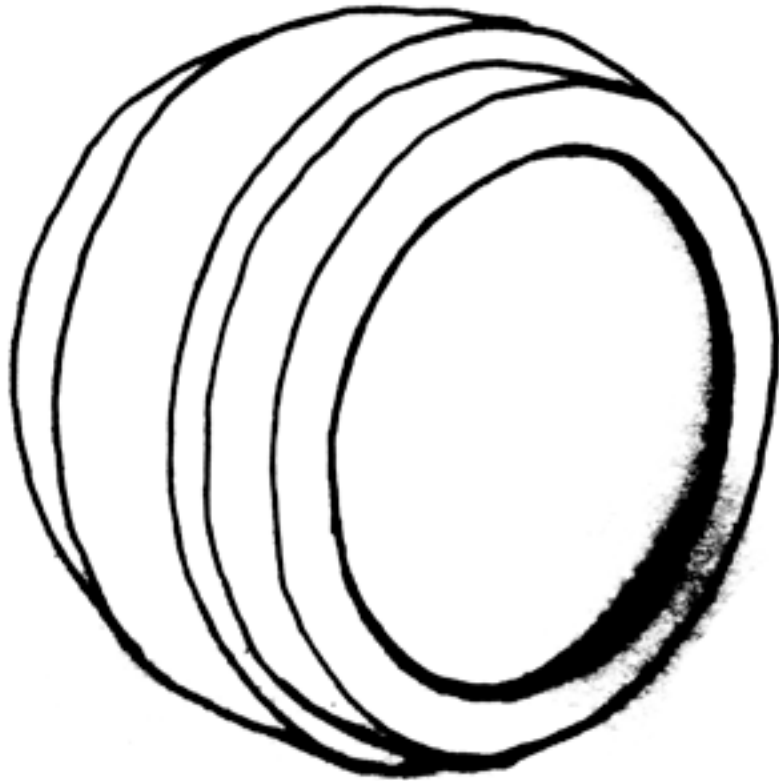
## Lens:

If you don't want to use a lens or do not have the budget for a lens make a pinhole box camera (see the next page).

The kind of lens you use will determine the size of your image. If you use a lens from a 35mm camera your image size will only be 24x36mm (0.9x1.1 in.). The ideal lens would be a large format camera lens because of the possibility to adjust the aperture and shutter speed. Relatively cheap lens of this sort are available in second hand markets or online auctions. You could also use the lens of a photographic enlarger, although enlarger lenses can only adjust the aperture. You would also need to make a lens cap/cover if using an enlarger lens. Removing the cap/cover for a certain amount of time serves as your shutter speed. The lens we illustrate here is a enlarger lens without shutter control.

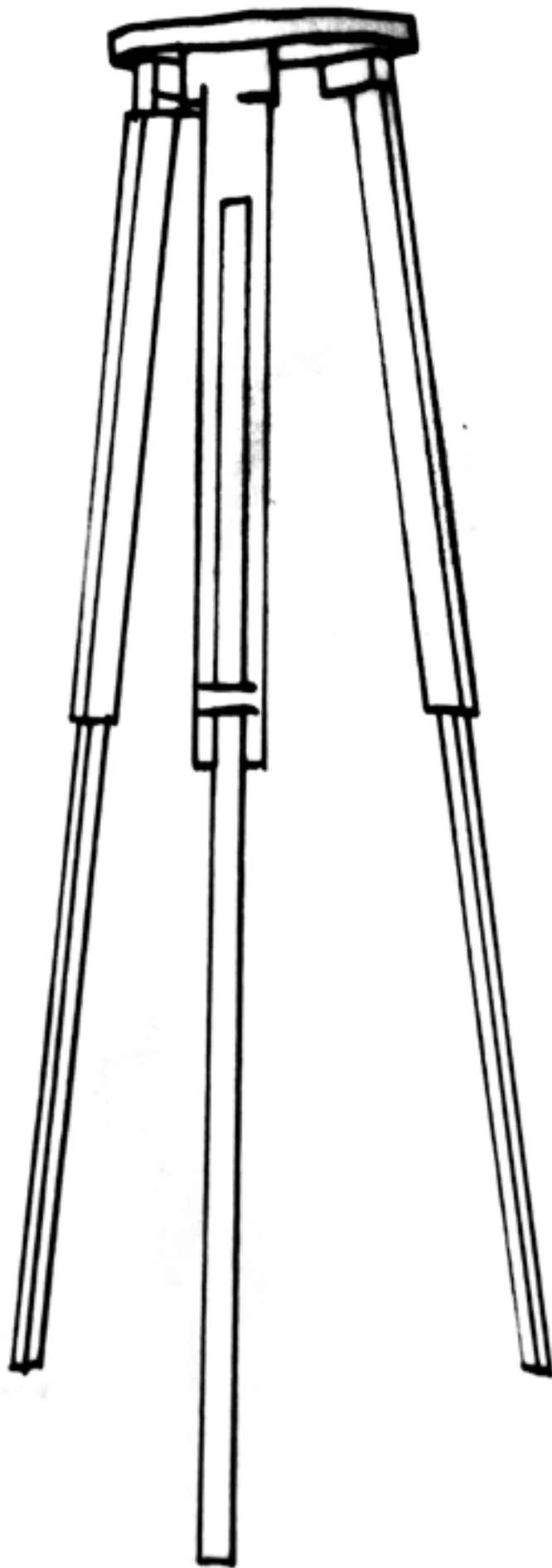






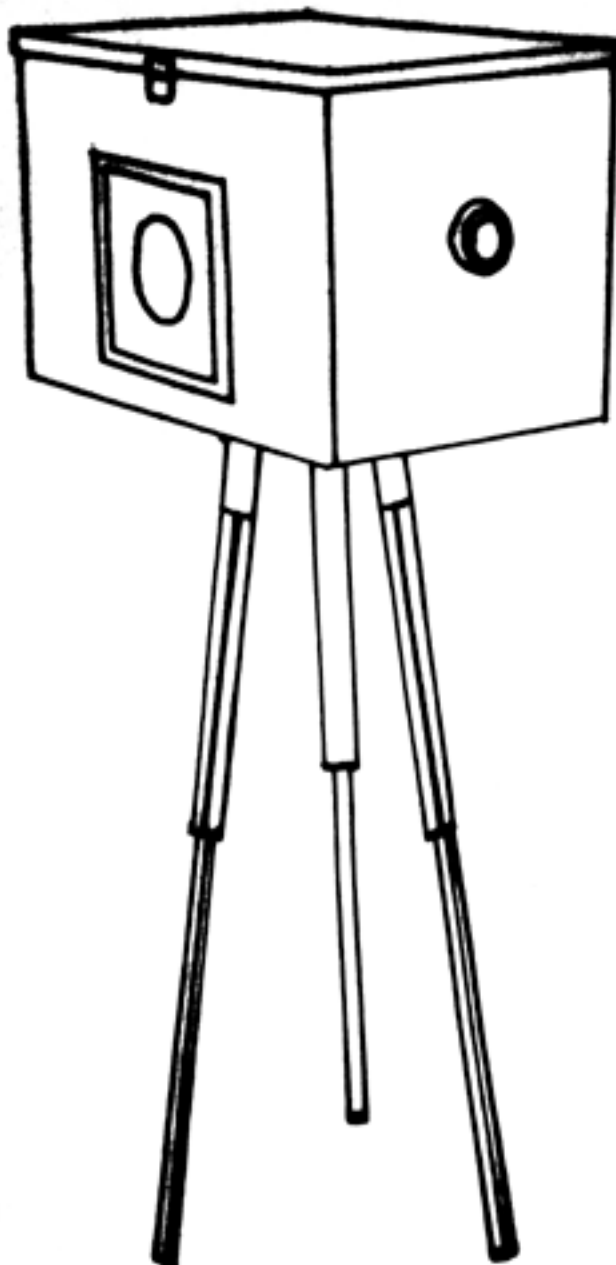
### **Note on making a pinhole camera:**

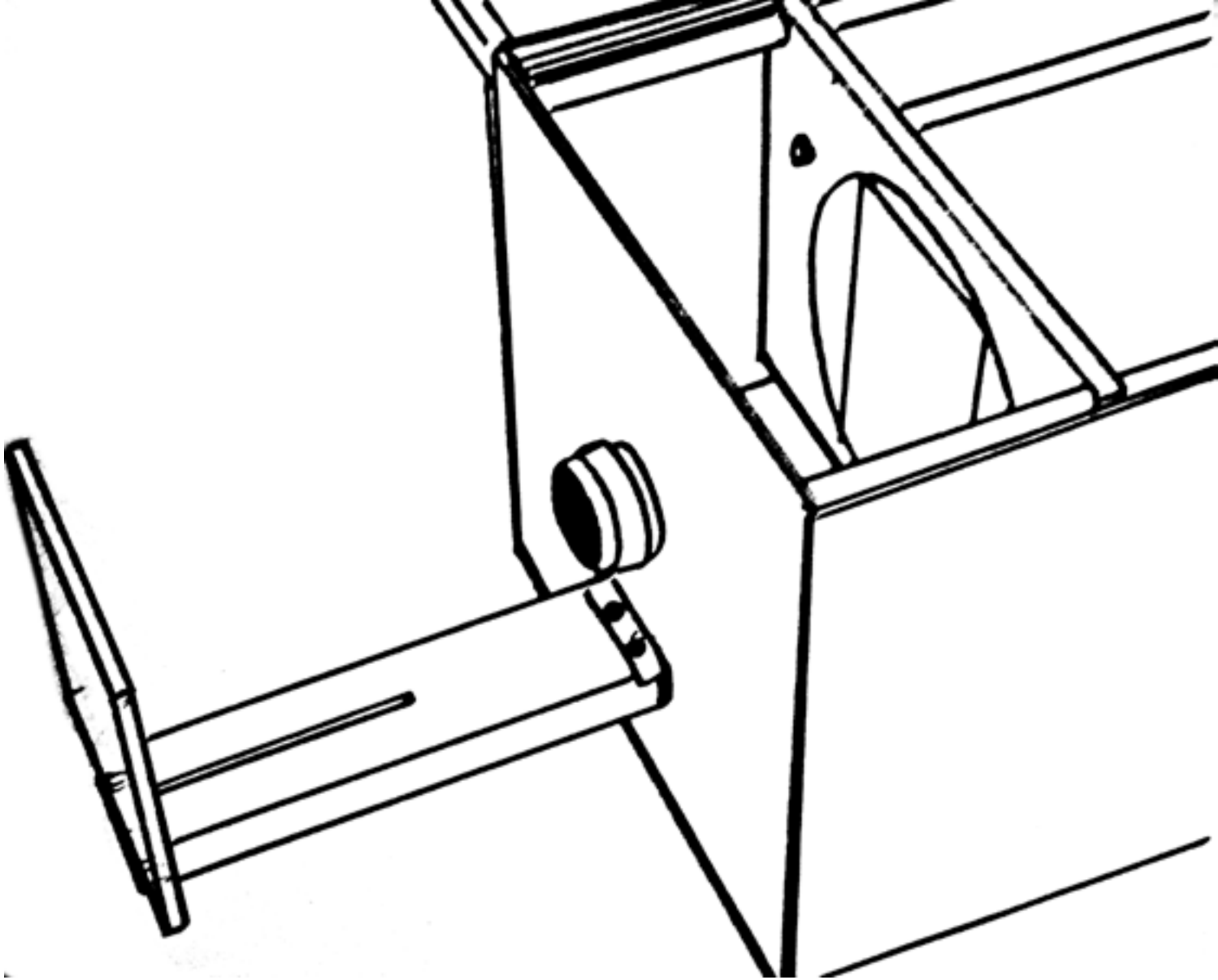
Use a strong black paper or sheet of thin metal and attach this to a hole cut out in the center of the front of the box (approximately 1cm/0.4 in. in diameter). The glass plate on the inside of the box should be about 7-15cm (2.7x6 in.) away from the pinhole. The pinhole should have a diameter of about 0.5mm. That would give you a good result. To get this opening you can use a No.10 sewing needle to push through the metal or paper (push it halfway in). The more circular the hole the more detailed the focus.



## Tripod:

You will need to make sure that the box is stable. The tripod should be strong enough to guarantee this. Either buy a professional tripod mount and attach it to the box or replace the pin in the top of the tripod with a long screw. Then drill a hole into the bottom of the box, stick the screw through and tighten it up with the right nut. To enforce this construction glue thin circular metal plates with a hole in the middle on both sides of the box. If your box is not made out of thick material you could also connect a base (e.g. wooden board) to your tripod and place the camera on top of that. Original Afghan cameras have very big wooden tripods allowing great stability; these tripods like the cameras are made by carpenters and weigh a lot.





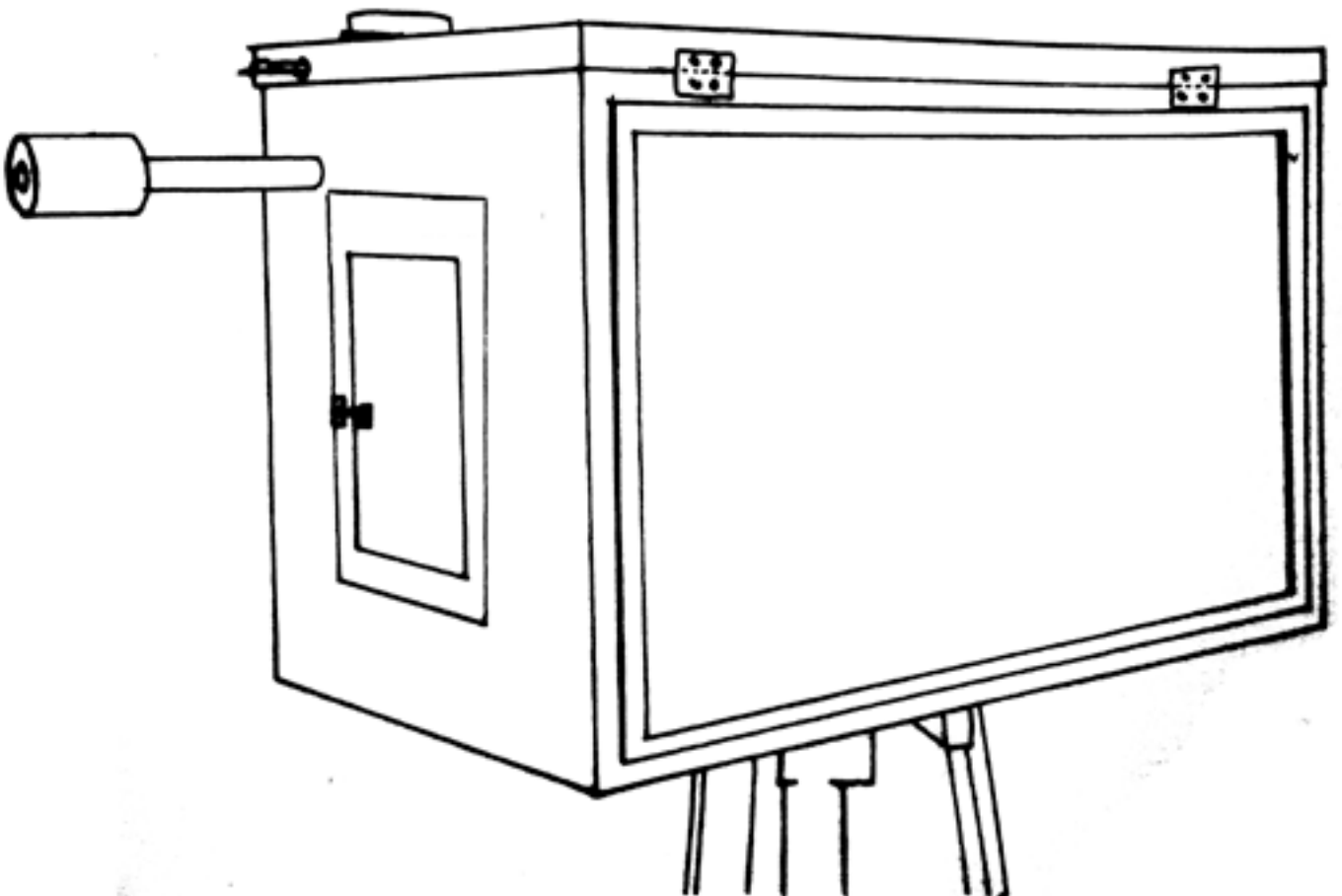
## **Negative holder:**

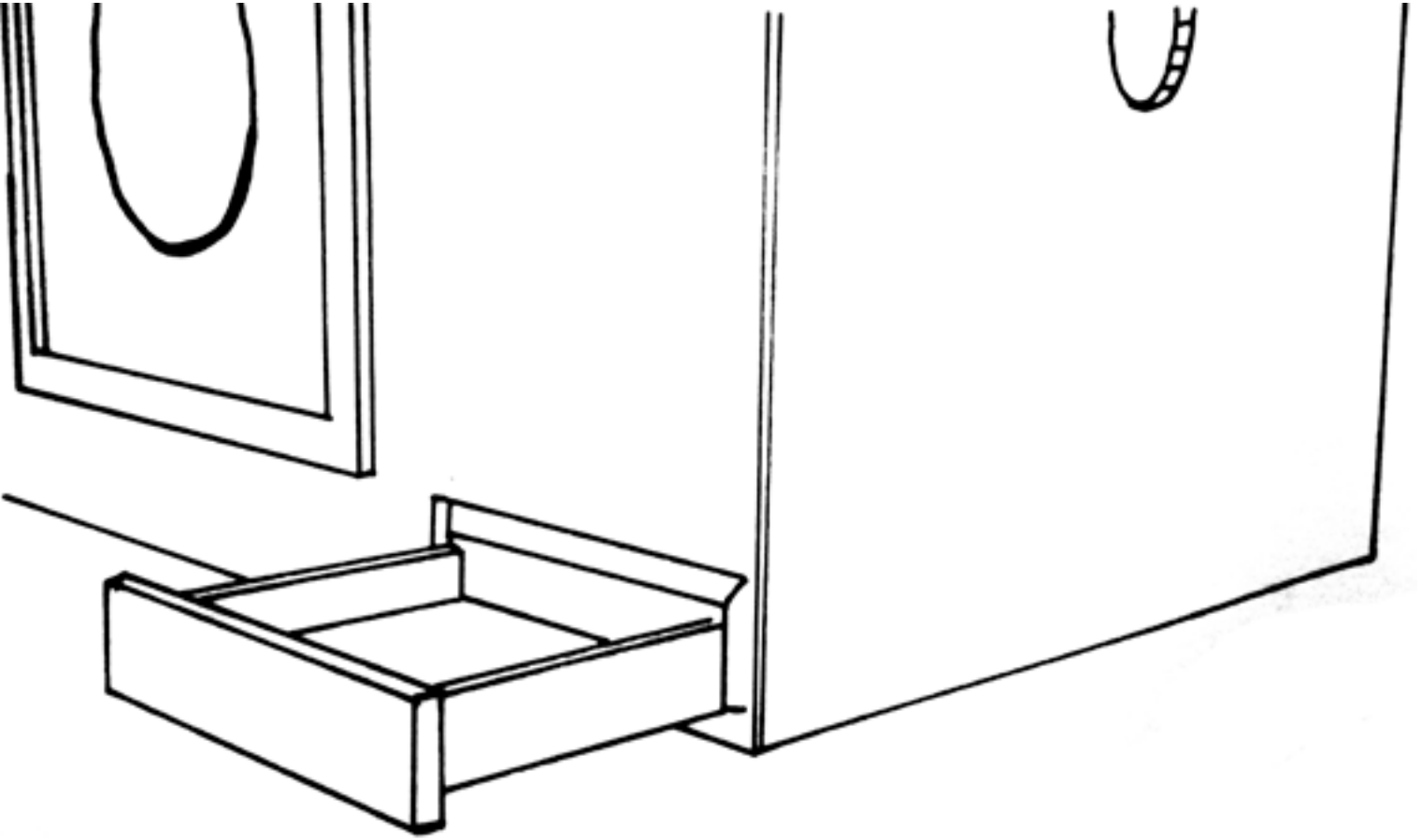
In order to make a positive picture you will need a negative holder which hangs in front of the lens. Later on you will place your negative onto this holder and photograph it to create a positive image. This construction can be made out of wood or light metal. The distance from the lens to the negative depends on how big you want your positive image to be. All you need are two pieces of wood or metal at a right angle ( $90^\circ$ ) to one another and attach this to the front or bottom of the camera. In our example camera we used a hinge to which the negative holder is connected in the front of the camera.

If you don't want to build a separate construction for this last part of the process, stick the negative to a wall or any other flat vertical surface and take a picture of it.

## **Display:**

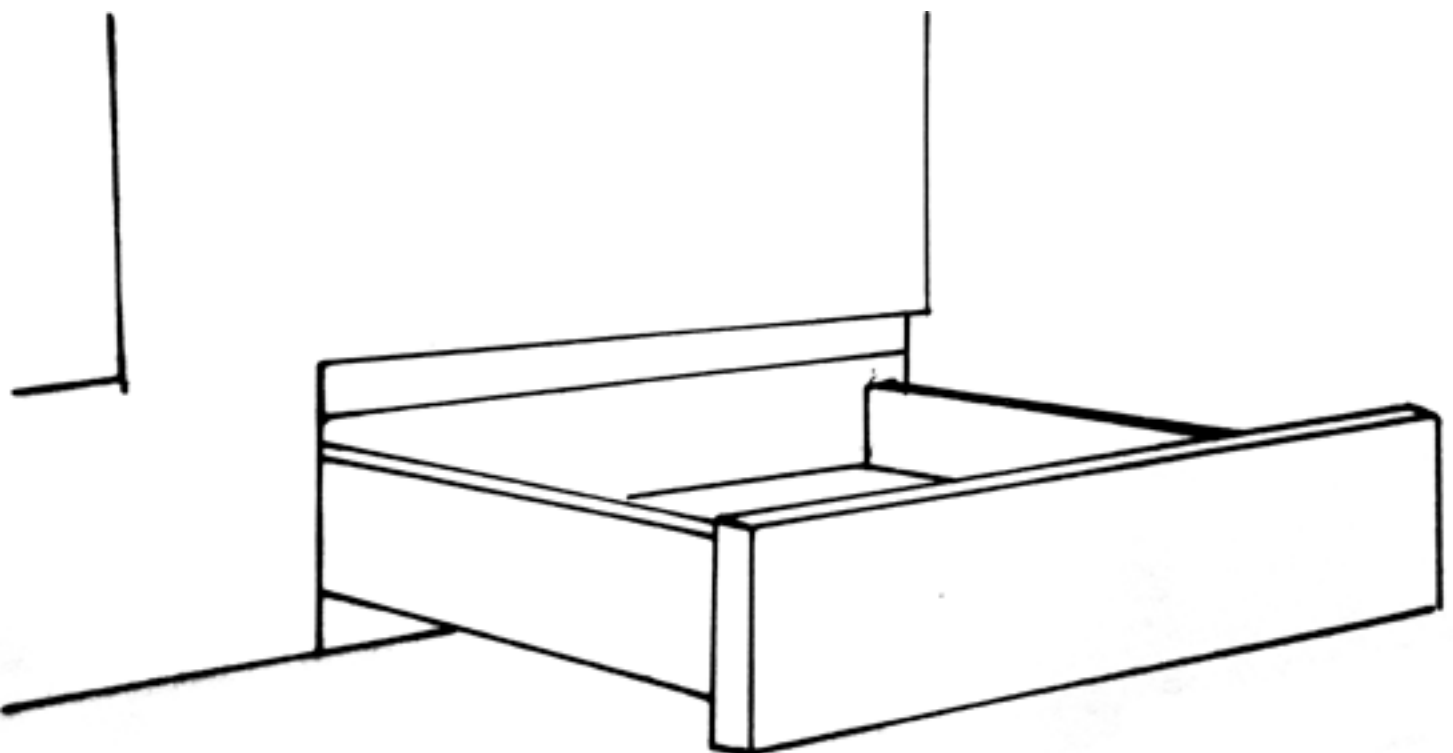
Many of the box cameras in Afghanistan have displays on the side of the camera. The photographers use this display to show examples of their work. Essentially the display is a framed plate of glass on hinges. Behind this, photographs are attached to the box.





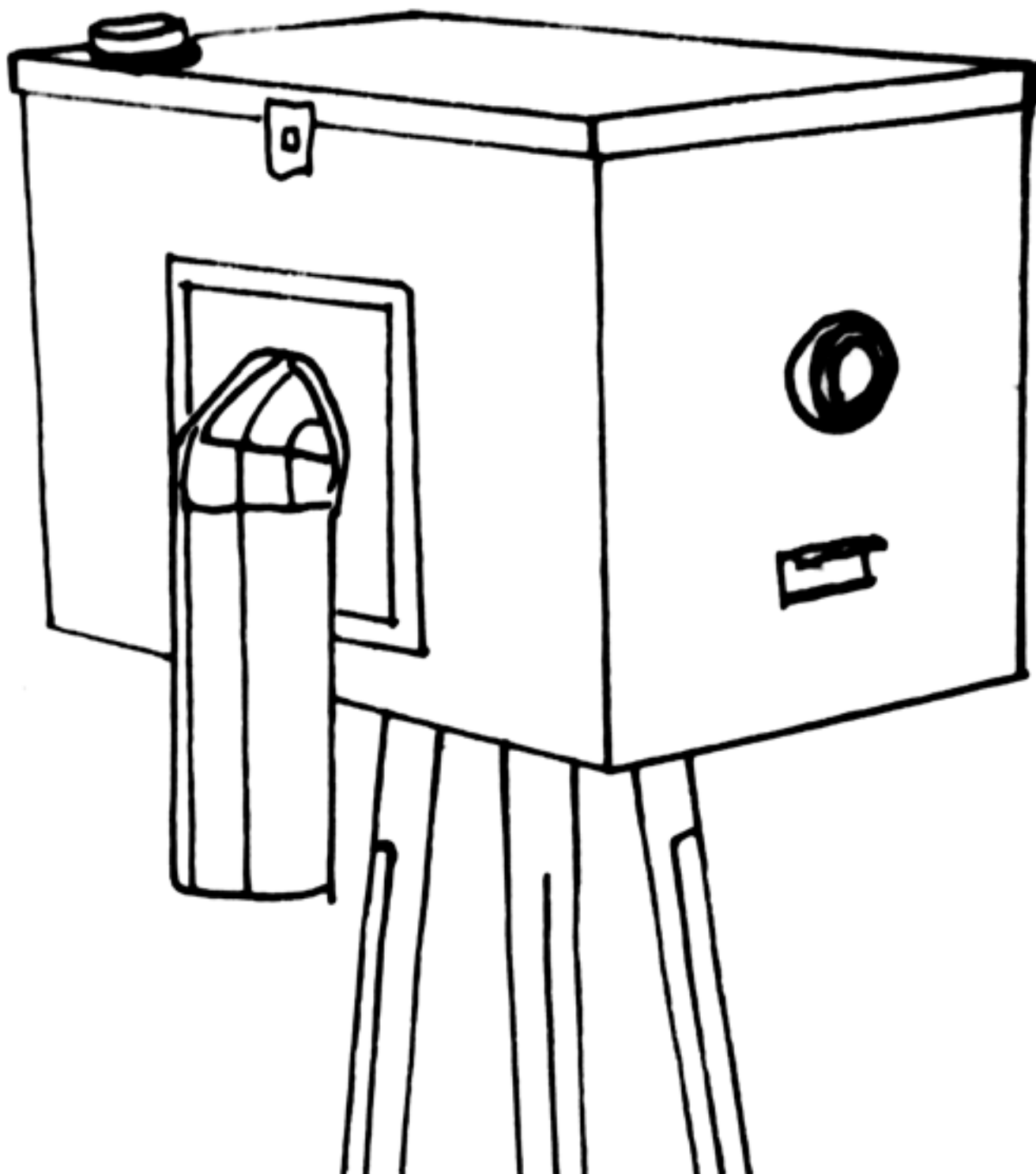
### **Tools drawer:**

Another extra feature you might want to add to your camera is a drawer for tools such as scissors or finished photographs. The drawer is located underneath the paper box. It has to be relatively small otherwise there won't be enough space inside the box for the paper box and the focusing plate.



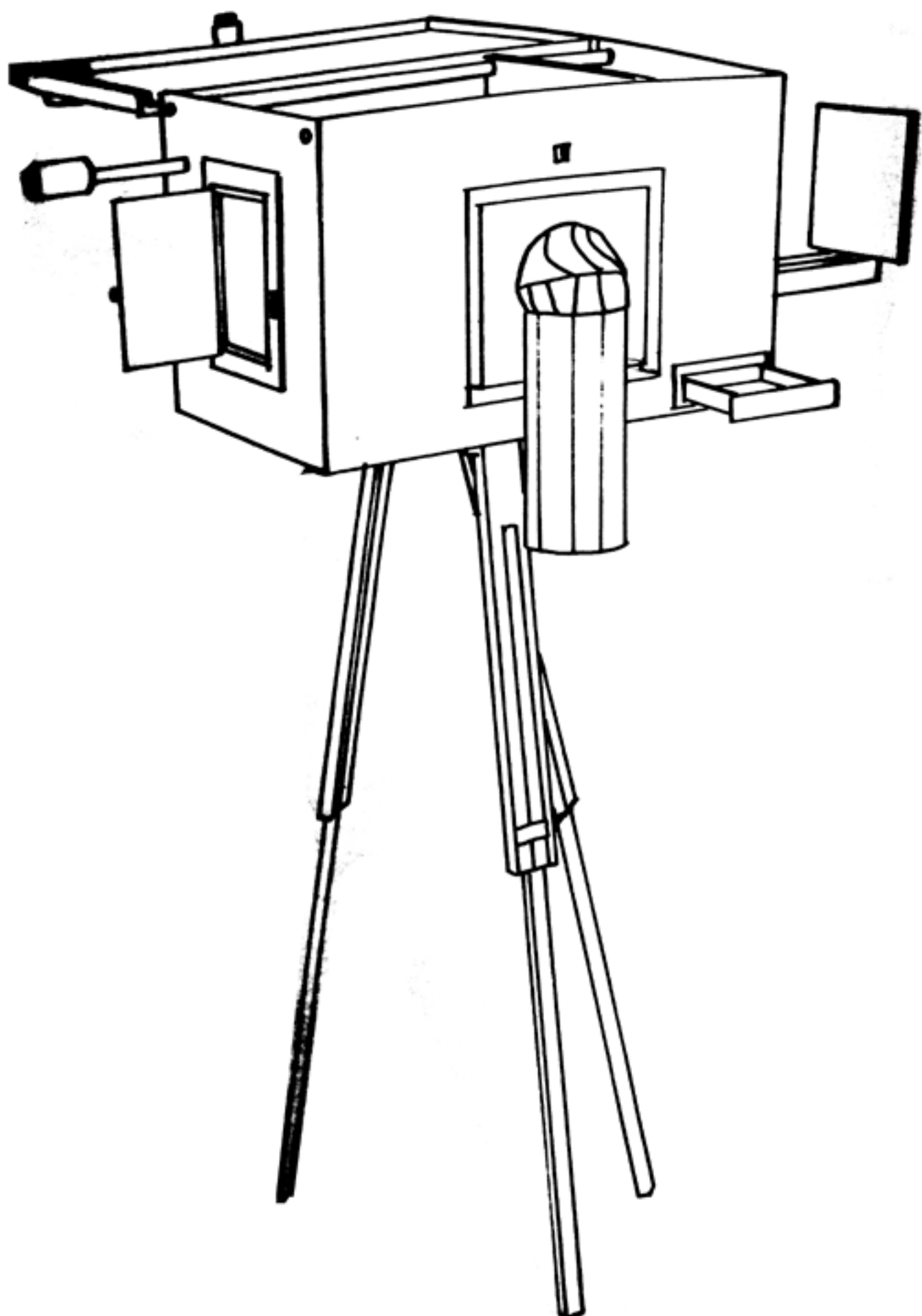
## Sleeve:

As a last step you have to put a light-tight cloth around the side hole through which you will later access the inside of the box. The fabric should be formed like a sleeve and be able to cover your arm at least up to the elbow. You could also use an old jacket if it is made of a suitable material. Most cameras in Afghanistan have old jacket sleeves attached to them.



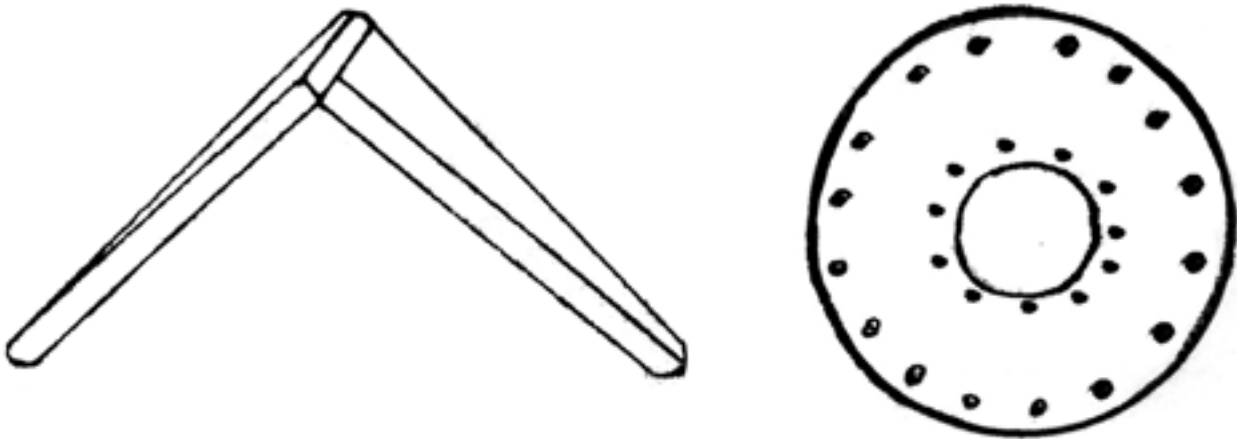
Finished camera





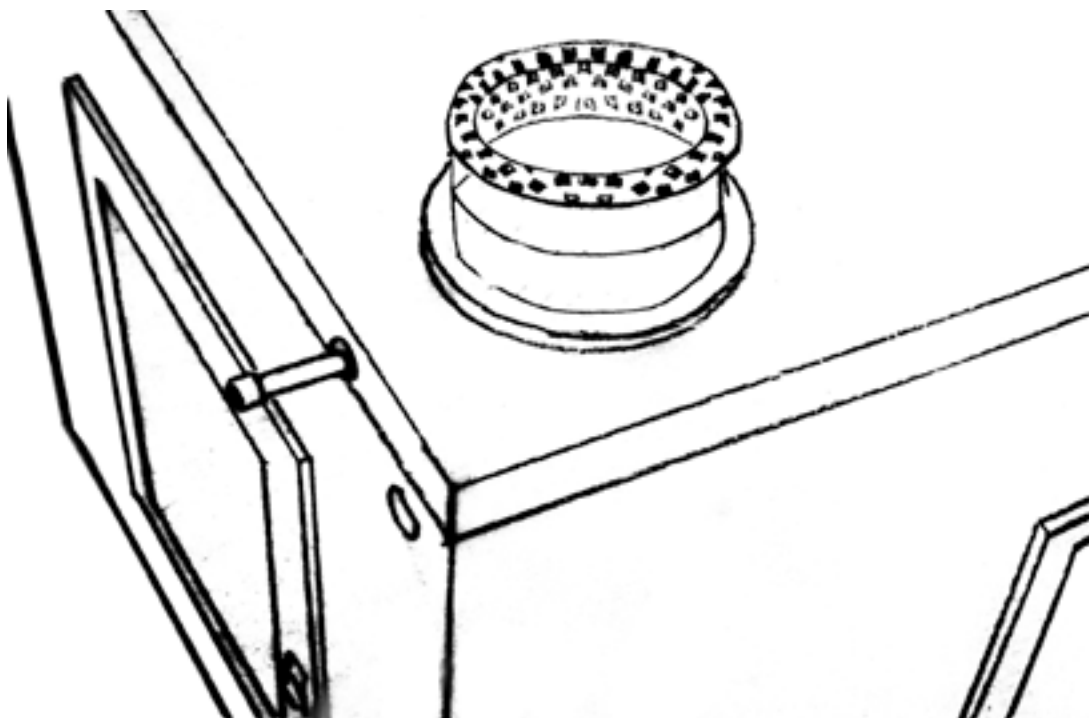
## Decoration:

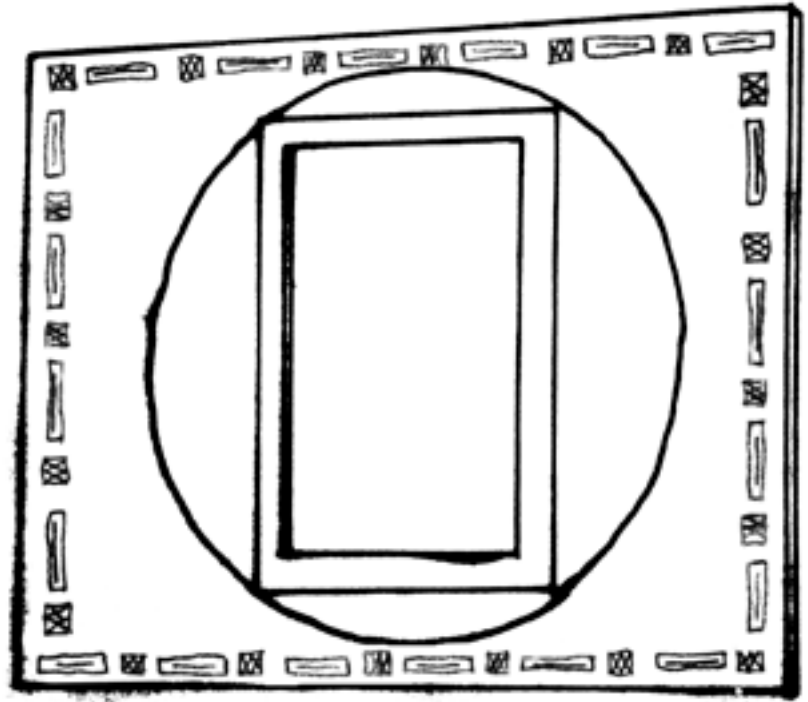
The carpenters who build the cameras as well as the photographers using them applied their own aesthetic sense in beautifying the kamra-e-faoree. Strong colours, curved wood, photographs, mirrors and stickers can be found on many cameras.



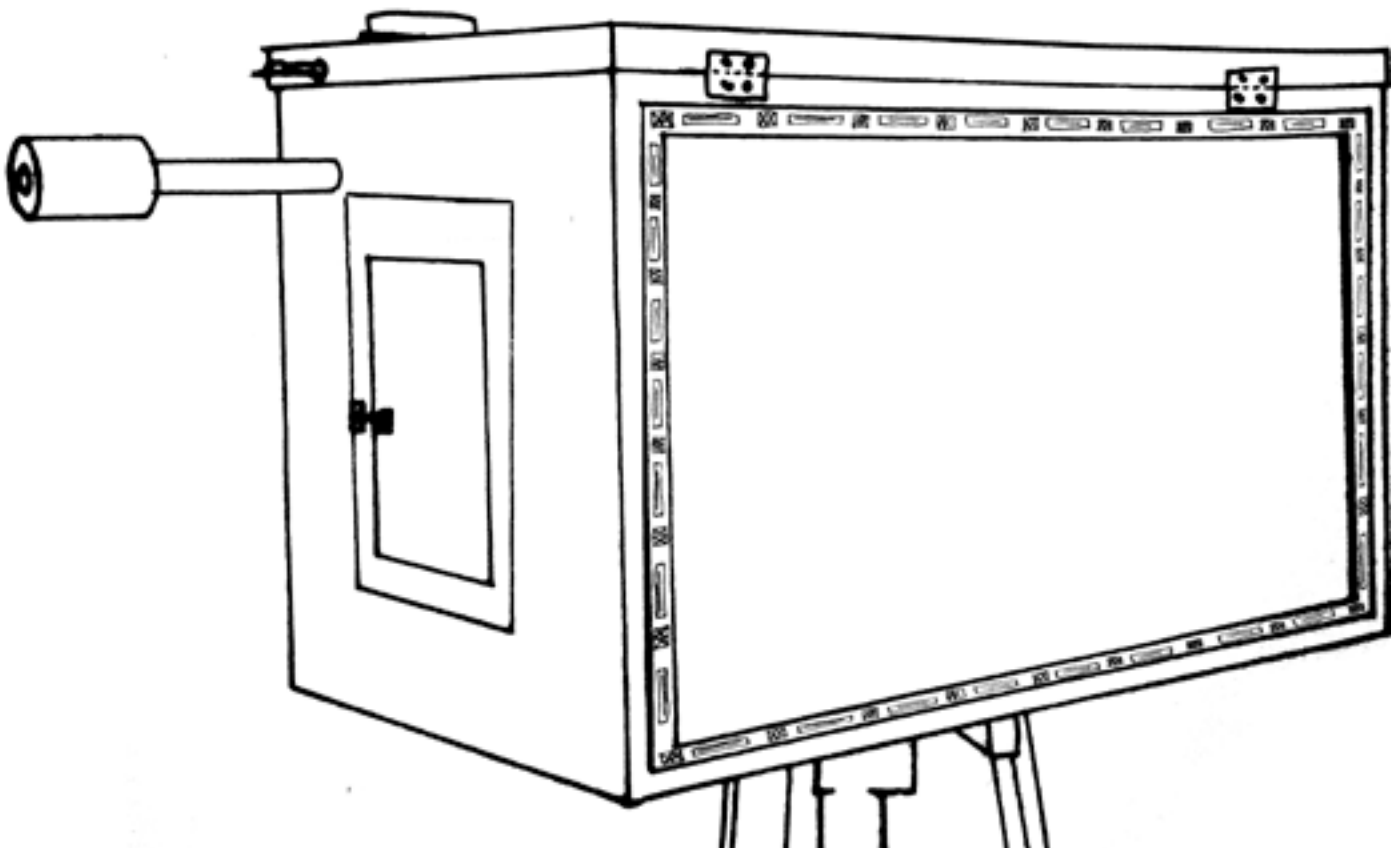
A **lens shield**, shown on the left, is attached above the lens hole. On the right is a **compact disc** with nails on the inner and outer rim; this is fitted over the lens hole.

A **metallic rim** can be placed over the eyehole tube. The one below had a chequered design.



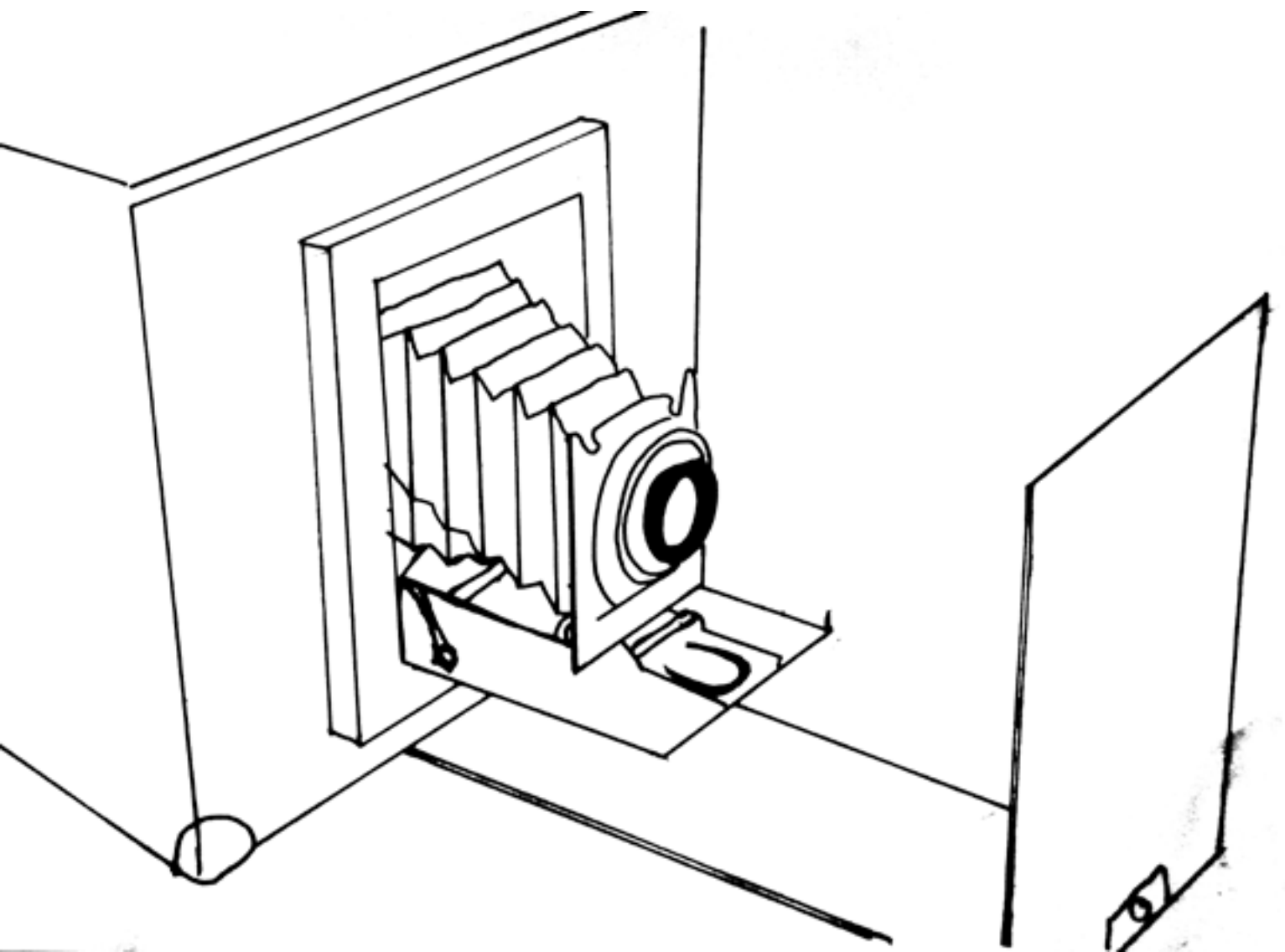


**Patterned lathing** can be attached to the edge of the focus plate (above) and the display frame (below).



## External focusing system:

As an alternative to the internal focusing system used in Afghanistan you could create an external focusing system. For this option you can either make your own focusing device or take parts of an old Polaroid Landcamera or plate camera. Light-tight bellows are the key. The distance between lens and paper will determine the focus of your subject according to how far it is away from the lens.



## **Notes on techniques:**

### **Aperture**

The aperture is inside your lens. In fact an aperture is in any kind of lens (whether that be a webcam, mobile phone, video camera, or photo camera) and controls how much light enters into the camera. The better the lens, the wider the aperture can open up. Very often the aperture is referred to as 'f. stop'. The aperture also controls the depth of field, meaning how much of your image is going to be in focus. A big aperture opening such as f.2, f.2.8 or f.3.5 would allow you to blur the background of your image. A small aperture opening like f. 11, f.16, f.22 would give a sharpness in the foreground and the background. For a small aperture opening, that is a big depth of field, you will need strong light or a slow shutter speed.

### **Shutter speed**

The shutter controls the length of time light will come through the lens into your camera. If you use a lens with an integrated shutter you can set it to a certain time, e.g. 1/60 second or 1 second. If you don't use a lens with a shutter you will need to cover and uncover the lens manually. This manual uncovering of the lens is equivalent to the shutter action.

### **Exposer time**

Depending on what kind of light environment you are in, e.g. sunlight, shadow or indoors. You will need to change your exposure time. The combination of light available, aperture, shutter speed and the sensitivity of your paper (ISO) determines your exposure time. For example, outdoor in shadow, an aperture of f.8 with and ISO of 5 might result in 1/2 second shutter speed.

### **Summary**

If you don't want to get into aperture, shutter speed and the more technical aspects of photography then follow this rule of thumb: outdoor in shadow use f.5.6 and 1/2s. Outdoors in direct sunlight in f.8 and 1/30s. Indoor with a lot of light f.5.6 and 3s.



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