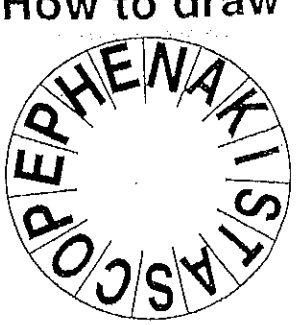
How to draw animation for the



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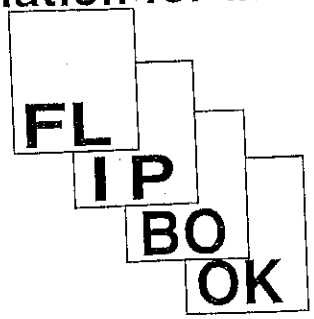


Animation is not the art of DRAWINGS that move but the art of MOVEMENTS-that-are-drawn.

– Norman McClaren
Canadian animation artist
1914–1987

So how do you make an animated movie? Well, the drawing is the easy part since it is not really the most important part. We are talking cartoons here, not the Mona Lisa. But to make a cartoon move, that does take a little bit more effort: some instruction, some trial, some error . . . okay, maybe some *more* error. But in the world of animation, error is just part of what makes it interesting and exciting. To see your first attempt at creating movement from a bunch of still pictures is very exciting.

Since all animation is based on sequential drawings, you might begin with a flipbook. Included is a little do-it-yourself flipbook. An animated sequence is placed on part of the page to which you can add whatever you like.

Just what is this guy looking at? First, cut out the 12 different squares on the two pages. Each square is numbered and should be placed in order, starting with page 1 on the bottom and ending with page 12 at the top. If you think you might want to try this a few times, copy the pages before you begin drawing. Perhaps try copying the printed sequence itself on blank paper and see what you come up with.

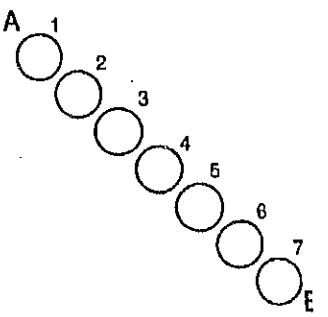
Scratchpads with the red gummed edge are useful. These can be bought very cheaply. Since all the paper is usually thin enough to see the page underneath and are glued at one edge registration is assured. This means that any drawing traced on top of another will be in the same relative position on each page. This is important so that things that you want to remain still will not jump around (unless you want them to do so). They can always be transferred to the phenakistascope later.

Animation is an artform that allows you to express the full reign of your imagination. By combining the flexibility of drawing/painting and the temporal (time) aspects of movies, most anything imaginable can be created. If you were to talk to most any professional animator, they'd tell you that either all rules are meant to be broken, or there just aren't any rules to be made. Yet a few pointers in the right direction couldn't hurt . . .

1) If you are new to drawing, you might want to start out with drawing something simple: perhaps a ball bouncing or a pendulum swinging. Drawing simple images will help you concentrate on the movement of things. As you feel assured of how transitions actually move from one to another appear move, you can then start to draw more complex images. If you are trying to animate a character, it is a good idea to create your character with simple forms. There's a well-known mouse that is drawn with just circles of different sizes. By simplifying the drawing of the character, you will be able to recreate this same character more easily without distorting its basic shape from page to page. Practice drawing it on separate sheets of paper, in different poses and with different expressions. (This is what is known as a model sheet.)

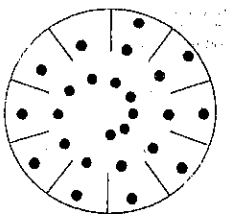
Simple shapes can be used to build more complex characters.

2) If you want something to move very slowly, then you draw each repeating image very close to the previous one, perhaps only a fraction of an inch in a different position. Conversely, if you want something to move very fast, you draw each subsequent image far from the previous. By far, I don't mean from one side of the page to the other, but some happy medium. You can play around with what are called "speed lines" which can help fill in a space through which something is travel. When combined with different drawings doing different things with different phase relations, some very beautiful animated images can be the result. The sky is the limit.

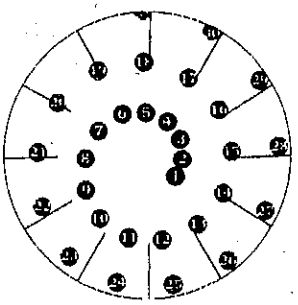


This ball will move from point A to point B at a medium speed.

A class unto themselves, these spiralled discs allow for more extended animation. Depending upon the number of spirals, more and more drawings can build the animation sequence. Also, since the last drawing does not meet the first, i.e. a closed cycle like those above, the animation is open-ended.



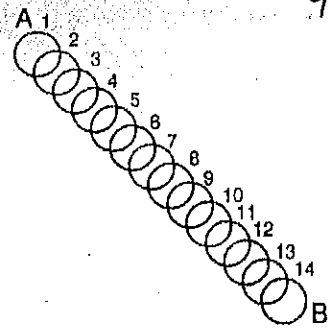
10 drawings around a 10-slotted disc. BUT instead of the 10th figure meeting the 1st, and thereby beginning a new cycle, each is placed slightly further outward from the center (radially). Thus the image will slowly rise, or fall, depending on spin direction.



13 evenly spaced figures around a 12-slotted disc. each figure is also placed outward radially. Thus, the figure will move outward and horizontally at the same time.

Admittedly, this sort of design for phenakistascope can seem to be a little tricky, especially for the beginner. Progress at your own pace. Make it fun, and don't try to master all this at once.

moving quickly. (You can find examples of this in many comic strips and Road Runner cartoons.)



All things being equal, this ball will move slower from A to B.

3) As mentioned above, when you want something to remain still, it has to be in the same position on each page as the previous, and following, image. If each page is in registration to the other, then all you will have to do is to trace over the previous image. I mentioned the scratch pad as one way to do this. Another method would be to use 3 by 5 inch index cards. Since they are all cut to the same size, all you will have to do is to line up their edges for registration. It helps to have some good lighting underneath your artwork as you draw with one page on top of a previously drawn page. If you have any sort of glass table on which to work, placing a light underneath will help in seeing through layers of index cards. In a pinch, you can even hold your paper up against an outside window and use the sunlight to see through them.

4) Abstract animation (that is creating forms and shapes without any particular relationship to objects in the natural world) can be the most fun. Since there is no reference to the real world to compare to, you can really let loose here with circles, squares, stars, squiggles and blobs, blacks, whites, colors of all sorts. But, just the same, it is still a

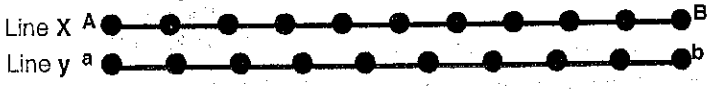
good idea to plan ahead, or all that freedom you find for yourself might just help you create a chaotic mess. The rules here might be of your own making, but that doesn't make them any less necessary for creating some sort of pattern or order that is pleasing or amusing, or perhaps even sad or scary.

Now what about that blank phenakistascope disc you still have? One of the easiest things to do is to transfer animation from a flipbook onto the phenakistascope. Individual sheets of paper are much easier to work with, preview and edit than a cardboard disc. The idea will be to first create a little flipbook of 9, 10, 11, 12, or 13 pages. The number of pages in the sequence will depending on the number of slots in the blank disc you are using. (In each set we provide discs with 10 and/or 12 slots.) Then you can transfer or trace each of the pages within each area of the disc. As your first attempt will be a simple sequence, be sure that your drawings will fit within the area in each frame (or actually, a wedge) of the disc. The slots already cut in the disc serve as boundary points.

Advanced Studies in Phenakistascopic Research

There are some special phenomena to consider with phenakistascopes due to their circularity and their inherent repetition of the drawings. You can make your drawings not only move within each wedge/frame, but also move across the frames, as if they were "travelling" horizontally. This happens through what is called a *phase relationship*, a mathematical name for a rather simple thing. For example, take two lines (**x** and **y**) that are of equal length, beginning and ending at **A** & **B**, and **a** & **b**,

respectively. Place dots at the beginning of each line, at **A** and **a**. Then, on line **x**, a total of 11 dots are placed in even increments and on line y, 10 dots are placed in even increments. If the two lines are place next to each other so that **A** and **a**, **B** and **b** are aligned, you will see a phase relation between the dots. You can easily imagine one dot to be faster than the other. In a phenakistascope this is exactly what happens, where points **A** & **B** are the same (that line is now a circle). And time and speed become evident when you spin the disc.



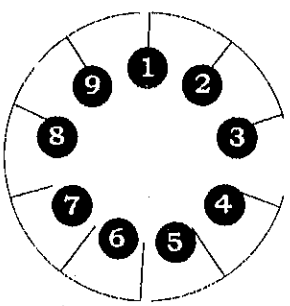
If you have 12 wedge/frames cut into the disc, but you only draw 11 drawings evenly spaced around the circle, you will have created a phase relationship between the frames and the drawings. Within each frame the drawing will be in a slightly different horizontal position than before until finally it is exactly back where it started. You can do the same with 11 drawings against 10 frames. And so on, until you hit extremes that won't work very well. As an extreme example, only 3 drawings against 10 frames just won't animate at all when viewed over 10 slots.

Here are some spacing requirements for a few different phase setups. All we are doing here is finding the circumference of the 8 inch disc and dividing it into the number of drawings that we might wish to draw. (Circumference = pi*2R[adius] or pi*D[iameter]) The circumference of an 8 inch circle equals 25.13. Remember, these measurements are for just at the edge of the circle

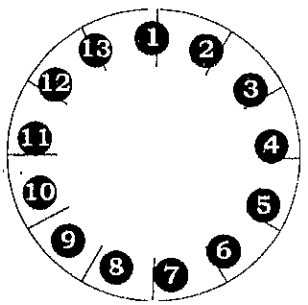
page and you won't be drawing everything right on the edge. Just extend a straight line from your measurement towards the center and place your drawing anywhere along each line.

With an eight inch diameter 10 slot disc, the spacing of:
9 drawings = 2.8 inches, or just under 2 13/16."
10 drawings = 2.5 inches, or just follow the slots"
11 drawings = 2.28 inches, or just over 2 1/4"
With an eight inch diameter 12 slot disc the spacing of:
11 drawings = 2.28 inches, or just over 2 1/4"
12 drawings = 2.1 inches, or 2 3/32, or follow slots"
13 drawings = 1.93 inches, or just under 1 15/16

The figures here show you some of the possible phase relations of drawings to slots. Each moves in a different way. Once you get the idea of this, you will find that you not only are animating your drawing but also are in control of



9 evenly spaced figures around a 10-slotted disc.



13 drawings within a 12-slotted disc. As in previous drawing, the figure will move horizontally.