

Chapter 4

Striking at the heat in the night

(thermal processes)

Here are the references and web links for the stories in the book. **Recently added references are highlighted.** For updates to those stories and for all the new stories, go to <http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=40>

June 2012

4.1 Dead rattlesnakes

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=Bb1R6xGC8HI&feature=related> slow-motion snake strike. You can see the venom squirt out of the fangs.

<http://www.keepbusy.net/play.php?id=decapitated-snake-head-attacks>

<http://www.youtube.com/watch?v=GiqxyozkCos> same video

<http://www.break.com/index/snake-attacks-after-losing-body.html> same video

http://www.metacafe.com/watch/823553/decapitated_rattle_snake_still_moves/

news items about squirrels and snakes

<http://news.mongabay.com/2007/0813-squirrels.html>

<http://acp.eugraph.com/news/news07/rundus.html>

<http://notexactlyrocketscience.wordpress.com/2007/08/19/ground-squirrels-use-infrared-signals-to-fool-heat-seeking-rattlesnakes/>

http://scienceblogs.com/grrlscientist/2007/08/squirrels_wave_hot_tails_to_co.php including videos

news item about decapitated snake biting someone

http://seattletimes.nwsourc.com/html/localnews/2003829929_dige10m.html

<http://www.scientificamerican.com/article.cfm?id=news-bytes-of-the-week-headless-snake-bites-hapless-man>

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4.2 Fire-detecting beetles

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://spectre.nmsu.edu/dept/docs/armu/arthropods/beetles/photo4.jpg> Photo of the beetle

<http://insects.tamu.edu/images/insects/common/images/b-txt/bimg150.html> Photo of the beetle in bark

<http://www.forestpests.org/subject.html?SUB=354> Photos of larvae in bark

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4.3 Bees kill hornet

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Bees kill via heating

<http://www.youtube.com/watch?v=K6m40W1s0Wc&feature=related>

<http://www.youtube.com/watch?v=JtFVQe4JRmA>

<http://www.sciencenews.org/articles/20050924/fob5.asp> News story plus photo

<http://www.boingboing.net/images/beefu.jpg> The same photo

Bees kill via suffocation

<http://www.youtube.com/watch?v=EuAfbt8-7VE>

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4.4 Huddling animals

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<http://www.youtube.com/watch?v=6AiCIZ9wM1o> Video

<http://www.youtube.com/watch?v=cgGL6SbMfKc&mode=related&search=> BBC video, David Attenborough

<http://video.google.com/videoplay?docid=1194255384237631189&q=huddling+penguins&hl=en> Video

http://notblogging.notwriting.com/2005/08/i_am_haunted_by_penguins.html News story plus photo
<http://www.youtube.com/watch?v=cgGL6SbMfKc&feature=related> penguin huddling, slow march from windward side

<http://www.aad.gov.au/default.asp?casid=3524> Scroll down to the huddling of the penguins

<http://www.kailo.org/about/images/penguins.jpg> Photo of huddling penguins

<http://www.aad.gov.au/default.asp?casid=2880> stories and photos, Australian Antarctic Division

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4.5 Space walking without a spacesuit

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Comments

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4.6 Drops on a hot skillet, fingers in molten lead

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Dean Baird's video:

<http://phyzblog.blogspot.com/2007/01/post-ptsos2-note-leidenball-video.html>

Me at UCLA:

<http://www.youtube.com/watch?v=TjEhMSADaHs>

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4.7 Short Story: A rather dreadful swallow

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.8 Walking over hot coals

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http://www.sptimes.com/2003/10/05/images/xlarge/B_1_1bfire_169174_1005.jpg Photo

<http://mangalorean.com/images/feature/0314dance8.jpg> Photo

http://news.nationalgeographic.com/news/2005/09/0901_050901_firewalking.html Photo (at the bottom) plus news story

http://www.straightdope.com/classics/a3_036.html Cecil Adams in his "Straight Dope" column

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4.9 Short Story: Fire-walking accounts

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.straightdope.com/classics/a3_036.html Cecil Adams in his "Straight Dope" column

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4.10 Freezing and supercooling water

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.kentchemistry.com/KentsDemos2.htm> One of Kent's videos is about the sudden freezing of a very cold soda

http://www.youtube.com/watch?v=n_H5ZIoZSBo&mode=related&search= Video showing how mechanical disturbance to a supercooled beer causes rapid freezing. Way cool!

<http://www.youtube.com/watch?v=4xTHSf1I2BY&NR=1> Similar

<http://www.youtube.com/watch?v=KqQu7wIOYwU&mode=related&search=> Rapid freezing of beer
<http://www.youtube.com/watch?v=CC3DUwseZn8&mode=related&search=> At a temperature well below the freezing point, pouring out water at the boiling point produces instant ice crystals

http://www.youtube.com/watch?v=fSPzMva9_CE Video #2 in which a few ice crystals suddenly cause supercooled liquid water to freeze

http://www.youtube.com/watch?v=fSPzMva9_CE Video # 3

http://www.youtube.com/watch?v=fSPzMva9_CE Video # 4 in which supercooled liquid water is poured into a container where it immediately freezes

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4.11 Eating sea ice

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.12 Cooling rates of initially hot and warm water

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.straightdope.com/classics/a2_098b.html Cecil Adams in his "Straight Dope" column

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4.13 Water frozen by the sky

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4.14 Saving the stored vegetables with a tub of water

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.15 Spraying an orchard to preventing freezing

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.16 Throwing hot water into very cold air

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=CC3DUwseZn8&NR=1> At a temperature well below the freezing point, pouring out water at the boiling point produces instant ice crystals

<http://www.youtube.com/watch?v=nUDuPyod1WU>

http://www.youtube.com/watch?v=PQEVcCv_xkQ&mode=related&search= Video # 2, including infrared images

<http://www.youtube.com/watch?v=A38iIubSBFQ>

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4.17 Icicles

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=WE4hZn1YgAY&mode=related&search=> Icicles can kill you, and that is a really embarrassing way to die

<http://www.youtube.com/watch?v=CeSvYK2RvWw>

Photos

http://curiouslee.typepad.com/photos/best_of_curiouslee/icicle_tip.html tip of icicle

<http://gallery.spacebar.org/f/a/photo/viewpic/1/91/1/>

http://www.raglanroad.org/weblog/archives/2005_12.html the ribs often seen on an icicle

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4.18 Ice dams at eaves

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.extension.umn.edu/distribution/housingandclothing/DK1068.html> Discussion plus nice diagram

http://www.umass.edu/bmatwt/publications/articles/ice_dams.html Discussion plus good photos, near bottom

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4.19 Rime ice and glaze ice on cables

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.michelestapleton.com/MtWash/pages/Mt%20Wash%20Rime%20ice%20on%20ro00006.htm> Photo

<http://www.zakon.org/robert/album/washington-winter02/> Photo

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4.20 Ice spikes and other ice formations

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Video

<http://www.youtube.com/watch?v=zAQ0OQUKDXA> Watch the spikes grow

Photos:

<http://www.its.caltech.edu/~atomic/snowcrystals/icespikes/icespikes.htm>

http://www.uweb.ucsb.edu/~cdelacerda/Ice_Spike2.jpg

<http://www.nbb.cornell.edu/neurobio/land/images/Crystal1.jpg>

http://upload.wikimedia.org/wikipedia/commons/thumb/d/d1/Ice_spike.jpg/800px-Ice_spike.jpg

http://upload.wikimedia.org/wikipedia/commons/thumb/d/d1/Ice_spike.jpg/800px-Ice_spike.jpg

Photo plus news story

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4.21 Cloudy ice cubes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.22 Figures inside melting ice

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4.23 Freezing of ponds and lakes

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4.24 Freezing carbonated drinks

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=n_H5ZIoZSBo&mode=related&search= Video showing how mechanical disturbance to a supercooled beer causes rapid freezing. Way cool!

<http://www.youtube.com/watch?v=4xTHSf1I2BY&NR=1> Similar

<http://www.youtube.com/watch?v=KqQu7wIOYwU&mode=related&search=> Rapid freezing of beer

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4.25 Bursting pipes

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4.26 Touching or licking a cold pipe

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.27 Bumps in winter, pingos in permafrost

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.geo.uu.nl/fg/berendsen/pictures/photography/alaska/Pingo.jpg> Photo

<http://www.arctic.uoguelph.ca/cpe/environments/land/features/freeze-thaw/pingoes.htm> Photos plus short discussion

http://www.mbari.org/news/news_releases/2003/paull_pingos.html Photos plus discussion

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4.28 Arctic ice polygons

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.crrel.usace.army.mil/permafrosttunnel/lg3d_Wedges.htm Discussion plus photos
<http://sis.agr.gc.ca/cansis/taxa/landscape/ground/nwt.html> Photos

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4.29 Growing stones in a garden, and patterned ground

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.hi.is/~oi/patterned%20ground%20Thule%201986.jpg> Photo of patterned ground

<http://carbon.hampshire.edu/~sroof/images/hol14.jpg> Photo

<http://www.yukoncollege.yk.ca/~agraham/svalbardpictures/pages/abe%20Zeipelodden%20patterned%20ground%203028.1.html> Photo

<http://www.uspermafrost.org/images/permafrost.jpg> Photo

http://www.uspermafrost.org/gallery/swalker/swalker_gallery.shtml Photos and discussion

<http://geoimages.berkeley.edu/GeoImages/Johnson/Landforms/GlacialPeriglacial/PatternedGround01.html>

<http://sis.agr.gc.ca/cansis/taxa/landscape/ground/nwt.html> Photos

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4.30 Ploughing boulders

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.31 Short Story

Dead-cat bomb and a frozen disappearance

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=QaprCLxG5Tg> Liquid nitrogen and flower

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4.32 Snowflake formation

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4.33 Skiing

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4.34 Ice skating and making a snowball

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=66CVS6drH-M> Penn State snowball fight, an uncontrolled fascination with the physics of hard-packing snow with pressure

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4.35 Ice walking

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<http://www.youtube.com/watch?v=Pia4i5sr0o0> video: Building an igloo

<http://www.youtube.com/watch?v=dTB666s8wwY> Video: building an igloo

http://www.youtube.com/watch?v=83YIR_k542w&mode=related&search= Building an igloo in a blizzard, part 1, TV news clips

<http://www.youtube.com/watch?v=j8KdTjf-zcw&mode=related&search=> More on the news clips

<http://www.phototour.ca/pop/igloo.htm> Photo

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4.37 Snowrollers

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Photos

<http://surfaquarium.com/eIDITAROD/2003/snowrollers.htm> More good photos

http://www.enquirer.com/editions/2003/02/13/tem_snowrollers13.html Photos plus news story

<http://epod.usra.edu/archive/epodviewer.php3?oid=45408> Photo plus description

<http://www.usatoday.com/weather/resources/askjack/wasnow1.htm> Scroll down to the news item and photo

<http://www.atmos.uiuc.edu/~jgrim/photos/wx/photos/roller2.jpg> Photo

<http://www.crh.noaa.gov/ilx/events/roller/roller.php> NOAA’S National Weather Service, brief description plus several really good photos

<http://surfaquarium.com/eIDITAROD/2003/snowrollers.htm> More good photos
http://www.enquirer.com/editions/2003/02/13/tem_snowrollers13.html Photos plus new story
<http://epod.usra.edu/archive/epodviewer.php3?oid=45408> Photo plus description
<http://www.usatoday.com/weather/resources/askjack/wasnow1.htm> Scroll down to the news item and photo
<http://www.atmos.uiuc.edu/~jgrim/photos/wx/photos/roller2.jpg> Photo

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4.38 Snow avalanche

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=6qVwIuznFW0> Video of skier who causes an avalanche, which then sweeps down the cameraman

http://www.youtube.com/watch?v=Z2L_3QIEgil&mode=related&search= Video: snowboarder triggers an avalanche

<http://www.youtube.com/watch?v=B0RWLxOFGLY&mode=related&search=> Video of avalanches

<http://www.youtube.com/watch?v=JhUhhbiNHIs&mode=related&search=> Video of snowboarder; very, very dangerous: racing with an avalanche. Music by Wolfmother (one of my favorite groups)

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4.39 Patterns formed by melting snow

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4.41 Homemade ice cream

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<http://www.youtube.com/watch?v=l9c5rmDQ9DE&mode=related&search=> Video

http://www.country-freezer.com/cf_20.JPG Photo

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4.42 Drinking hot coffee, eating hot pizza

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.44 Boiling an egg

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4.46 Campfire cooking

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.kickassbbq.com/chimney.jpg> Photo

<http://www.campfiredeude.com/campfire-cooking.shtml> Photos plus descriptions

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4.47 Cooking pizza

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4.48 Heating in a microwave oven

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=nkM8XpY3ItA&feature=related> Adding powder to water that has been superheated in a microwave oven

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4.49 Popping popcorn

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.50 Cooking scrambled eggs

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=C1SM73Qi1BQ> Instruction video. Note the rule about not using salt before the eggs cook.

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4.51 Geysers and coffee percolators

This item is discussed in the book *The Flying Circus of Physics*, second edition, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.52 Toy putt-putt boat

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=boqUUPMT6Gc> Video

<http://www.youtube.com/watch?v=pHf2Uj13s0c> Video

<http://www.youtube.com/watch?v=K-BoCDiouMU> Video: boat takes a few second before it begins to move

<http://www.sciencetoymaker.org/boat/index.htm> descriptions plus a button to see boats built by lots of people, a button to see patents, and other buttons

<http://www.nmia.com/~vrbass/pop-pop/> Web site devoted to putt-putt (pop-pop) boats

<http://www.glue-it.com/boats/general-information/glossary/p/putt-putt.html> Sketch plus description

<http://www.puttputtboats.com/edu.html> Description plus photos

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4.53 Thermal effects on lengths

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.upscale.utoronto.ca/IYearLab/Intros/ThermalExpans/Images/Train1.gif> Old newspaper photo of railway tracks that have buckled by thermal expansion

<http://www.physics.brocku.ca/courses/1p23/Heat/rail.html> Similar photo, with a short discussion

http://tapseis.anl.gov/guide/photo/Above_Ground_Pipe_and_Dalton.html Photo of zig-zag pipe

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4.54 Collapse of railroad storage tank

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://video.aol.com/video-detail/railroad-tank-car-implosion/108399741> video, a railroad tanker car

http://www.youtube.com/watch?v=E_hci9vrvfw&feature=related same video

<http://blog.onlinemetals.com/?tag=rail-car-implosion> photos of accident

<http://mattson.creighton.edu/BarometricPressure/Tankerview1.jpg> Photo of the crushed tanker car
<http://www.delta.edu/slime/cancrush.html> Another photo
<http://www.youtube.com/watch?v=Uy-SN5j1ogk&feature=related> barrel heated, sealed, and then floated in water to cool
<http://www.youtube.com/watch?v=GgRjPDkPkzs&feature=related> high-speed video of can being crushed by air pressure
<http://www.youtube.com/watch?v=z1657tCCudw&feature=related> can crush in a classroom setting
<http://www.youtube.com/watch?v=0fy4TLMNb6s&feature=related> classic television with Julius Sumner Miller
<http://www.youtube.com/watch?v=XejHq8AQxQE> Barrel is first heated, then sealed, and then cooled with water.
<http://www.youtube.com/watch?v=r2yUcnnQX1Q&NR=1> University of Minnesota physics demonstration
http://www.youtube.com/watch?v=_yRBb8k1Sci&feature=related Rhodes College, barrel crush and a bit of football chanting

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4.55 Drying of hanging laundry

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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4.56 Warm coats

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.57 Warm plants

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<http://www.sciencenews.org/articles/20031213/bob9.asp> News item plus photos, including one of a plant that has melted snow

<http://www.darbycreeks.org/skunk%20cabbage%2072.jpg> Skunk cabbage has melted the snow around it.

<http://biolessondeblog.blogspot.com/2007/01/interesting-fact.html> The blog spot that contains that photo.

<http://www.uwgb.edu/biodiversity/phenology/2003/symfoe20030316uwgb.jpg> Photo

http://www.deanswildflowers.com/Blog/Fe08_WL_SCabbage1.jpg Photo

<http://www.fosc.org/Images/SkunkCabbage.jpg> Photo

<http://www.pathcom.com/~wgbz/xv040tri.jpg> Photos

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4.59 Black robes and black sheep in the desert

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.wonderquest.com/black-robos.htm> News item plus photo

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4.60 Cooling rate of a cup of coffee

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4.62 Dunking bird

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<http://www.youtube.com/watch?v=kjqjWv4eZiE> Video

http://scienceblogs.com/clock/2006/08/bird_magic.php History of the dunking bird

<http://science.howstuffworks.com/question608.htm> Photo plus description

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4.63 Short Story: Large dunking birds

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4.64 Heat pipes and potato stickers

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4.65 Foggy mirrors

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<http://www.youtube.com/watch?v=nL0KeVmDRBc> Writing on a foggy mirror, with a bit of music.
http://www.metacafe.com/watch/838882/fun_halloween_prank/

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4.67 Water collection in arid regions

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<http://www.fes.uwaterloo.ca/faculty/newsletter/march2004/fog.html> News story plus photos

<http://www.sciam.com/article.cfm?articleID=000CECBE-91F8-1C75-9B81809EC588EF21&pageNumber=3&catID=4> News story plus photos

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4.68 Mud cracks

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.gps.caltech.edu/~rkopp/photos/Andros2005/images/pc120611_mudcracks.jpg Photo

<http://www.terrageria.com/america/nevada/black-rock-desert/picture.usnv9106.html> Photo

<http://www.geology.wisc.edu/~struct/trips.html> Photo

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4.69 Inflating juice containers on airplanes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.70 Inflating bubbles and balloons

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4.71 Making cakes at high altitudes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.tmk.com/books/eastriver/east.shtml> Report on the construction of the tunnel under the East River in New York City. Scroll down to the material on air pressure.

<http://www.tmk.com/books/tunnel/tunnel.shtml> Report on the construction of the tunnel under the Hudson River in New York City.

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4.73 Short story: Stuck in a bottle

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4.75 Stack plumes

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.colorado.edu/MCEN/flowvis/galleries/2003/assignment3.html> Photo of stack plume becoming unstable

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4.77 Fire in a fireplace

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4.78 A candle flame

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4.79 Spraying a fire

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos:

http://www.youtube.com/watch?v=d96ywpu_-R4&mode=related&search=flashover

[http://www.youtube.com/watch?v=CMEg6x3HYFQ&mode=related&search=Flashover traps a firefighter on the roof](http://www.youtube.com/watch?v=CMEg6x3HYFQ&mode=related&search=Flashover+traps+a+firefighter+on+the+roof)

[http://www.youtube.com/watch?v=uYAdffzkYlw&mode=related&search=Video: look for the flashover near the end, almost gets the firefighter on the roof](http://www.youtube.com/watch?v=uYAdffzkYlw&mode=related&search=Video:look+for+the+flashover+near+the+end,+almost+gets+the+firefighter+on+the+roof)

<http://www.youtube.com/watch?v=Io15LR6XTJI> Big flashover near the end, almost gets the firefighters

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4.80 Cooking-oil fires

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.81 Brush fires and forest fires

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.82 Firestorms

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos

<http://www.youtube.com/watch?v=gXzhYgOpvuw> San Diego fires 2007

<http://www.youtube.com/watch?v=5Fw1qiAld2U> Whirlwind races along burning material

<http://www.youtube.com/watch?v=Wwn-PHMnz6Q>

<http://www.youtube.com/watch?v=YFwzNNEuOSY&mode=related&search>

http://www.youtube.com/watch?v=XaX_Hm5DI5E Watch the swirling in the fire

<http://www.youtube.com/watch?v=YFwzNNEuOSY&mode=related&search=> Dust devil (vortex)

produced by a fire

<http://www.youtube.com/watch?v=OnevoZZvbig> Larger scale swirling from a fire

<http://www.youtube.com/watch?v=c8kQbGa72tM&mode=related&search=> Swirling in a controlled fire demonstration

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4.83 Temperature regulation in mounds and buildings

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=tdnVmOzYofw> Video showing Iranian "wind catcher"

<http://www.hinduonnet.com/fline/fl2208/stories/20050422000106500.htm> Scroll down to the cooling tower

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4.84 Warmth of greenhouses and closed cars

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.85 Heat islands

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=LPIFcABniYk> Pink Floyd’s “Money” is the music; images and photos of the development around Atlanta is the visual. (Mild cursing in the song.)

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4.86 Rubber-band thermodynamics

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

<http://www.youtube.com/watch?v=OW6aEmOsXv0> Video of a rubber band heat engine

http://www.haverford.edu/physics-astro/Demonstrations/thermo/rubber_band_heat_engine.htm Photo and description of a rubber band heat engine

http://www.haverford.edu/physics-astro/Demonstrations/thermo/rubber_band_heat_engine.htm Photo and description of a rubber band heat engine

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4.87 The foehn and the chinook

This item is discussed in the book *The Flying Circus of Physics, second edition*, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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4.88 The boiling water ordeal

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4.89 Energy in a heated room

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4.90 Icehouse orientation

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4.91 A radiometer toy and its reversal

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<http://www.newenergyshop.com/pic.ExtraordinaryEngines/ExtraordinaryEngines.Radiometer.jpg>

Photo

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4.92 Water wells and storms

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4.93 Insect and shrimp plumes

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