

Re: Here's one for Bob (hope it makes your head spin)

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Source: <http://unix.derkeiler.com/Newsgroups/comp.os.vms/2007-09/msg00457.html>

- *From:* Ron Johnson <ron.l.johnson@xxxxxxx>
 - *Date:* Fri, 07 Sep 2007 22:18:48 -0500
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On 09/07/07 21:05, Jeff Campbell wrote:

Ron Johnson wrote:

On 09/07/07 16:27, Doug Phillips wrote:

Ron Johnson wrote:

On 09/07/07 10:08, Doug Phillips wrote:

On Sep 7, 7:40 am, Ron Johnson
<ron.l.john...@xxxxxxx>
wrote:

Guns use chemically unstable materials to "[produce] a sudden expansion of the material usually accompanied by the production of heat and large changes in pressure (and typically also a flash and/or loud noise) upon

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initiation;
this is
called the
explosion.]

The gas
expanding
in the
confined
area of the
barrel
"blows" the
projectile
out the
barrel like a
breeze
blows a
leaf, or a
person
blows a
feather with
his
breath.

OTOH,
rockets
"[obtain]
thrust by the
reaction to
the
ejection of
fast moving
fluid from
within a
rocket
engine."

However...
the gun's
recoil is an
expression
of
Newton's
3rd.

Newton's third law: "For
every action there is an
equal
an opposite reaction."

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You have described actions
-- chemicals exploding, gas
expanding, breeze and
breath blowing -- and
named the
reactions to those actions.
Where is the law not
applicable in any of your
examples?

How is "breeze pushing a leaf" an opposite
reaction?

http://en.wikipedia.org/wiki/Newton's_laws_of_motion

A more precise statement of the third law can be found there:

"LAW III: To every action there is always opposed an equal reaction: or the mutual actions of two bodies upon each other are always equal, and directed to contrary parts. – Whatever draws or presses another is as much drawn or pressed by that other. If you press a stone with your finger, the finger is also pressed by the stone. If a horse draws a stone tied to a rope, the horse (if I may so say) will be equally drawn back towards the stone: for the distended rope, by the same endeavour to relax or unbend itself, will draw the horse as much towards the stone, as it does the stone towards the horse, and will obstruct the progress of the one as much as it advances that of the other. If a body impinge upon another, and by its force change the motion of the other, that body also (because of the equality of the mutual pressure) will undergo an equal change, in its own motion, toward the contrary part. The changes made by these actions are equal, not in the velocities but in the motions of the bodies; that is to say, if the bodies are not hindered by any other impediments. For, because the motions are equally changed, the changes of the velocities made toward contrary parts are reciprocally proportional to the bodies. This law takes place also in attractions, as will be proved in the next scholium."

Hope that helps.

It does. The ground pushes up against me as I walk, the table pushes up against the book, etc.

But it does not (yet, to me) explain the "excess" force from the expanding gas which accelerates the projectile down the barrel.

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Another example: it is N3 that keeps a stationary rubber ball *on* the table, but it is the "excess" force from gravity, a throwing arm, what the ball and table are made of, etc, which causes it to bounce back off the table.

What am I misunderstanding?

The gun barrel is open at one end (hopefully 8-)) at the time propellant in the bullet (shell) is burning. The resistance to displacement exhibited by the gun barrel walls, stiff and unmoving 8-) versus the lack of resistance (in a vacuum) or very low value of resistance to displacement exhibited by the column of air in the gun's barrel when compared to the resistance of the barrel's walls, forces (no pun intended 8-)) the bullet to move toward the barrel's open end as the burning propellant produces expanding gas pressure. For a short time before the propellant is totally consumed the resulting gas pressure is uniformly and equally applied to the barrel walls and the base of the bullet. The barrels walls do not move (much 8-)), the bullet can and does.

Correct. Inertia and acceleration.

/Mythbusters/ is always fun to watch. Firing a 12ga shotgun submerged in water caused the barrel to explode.

A rocket motor operates in exactly the same fashion. The rocket's burn chamber is enclosed by walls in all directions except for the opening that leads to the nozzle. These walls resist displacement by the gas pressure created by burning the rocket motor's propellant. The gas pressure opposite the nozzle opening is what propels the rocket motor (and the stuff attached to it 8-)) in the same direction as that exerted gas pressure. This force is why a rocket motor can operate in a

You mean the *opposite* direction as the gas?

vacuum. The exhaust gases leaving the motor via the exhaust nozzle do not 'push' against the atmosphere to move the rocket, there being no 'air' in outer space.

Correct. Purely Newton's 3rd Law.

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Ron Johnson, Jr.
Jefferson LA USA

Give a man a fish, and he eats for a day.
Hit him with a fish, and he goes away for good!