



Preliminaries

The Basic Framework and Initial Questions

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Roadmap:

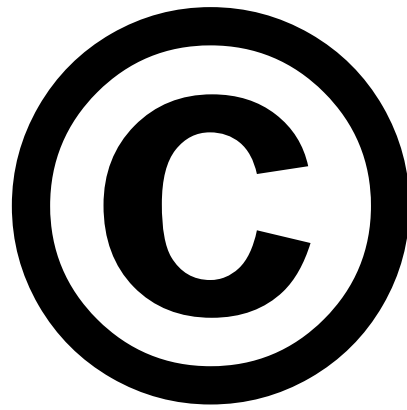
- What is intellectual property?
 - The kinds of IP
 - Comparisons
 - The label “intellectual property”
- Why is IP law necessary?
- How did IP law come to be?

**What is
intellectual
property?**

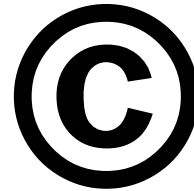
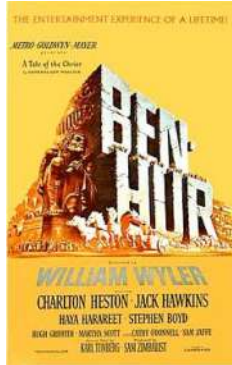
**the kinds
of IP**

What is
“intellectual property”?

Copyrights
Trademarks
Patents
Trade Secrets
Rights of Publicity



Copyright



Copyright



Copyright

- Books
- Poems
- Movies
- Computer software
- Photographs
- Paintings
- Sculptures

Copyright

- original works of authorship fixed in any tangible medium of expression from which they can be perceived, either directly or with the aid of a machine

Copyright ©


Protects	expression (text, images, recordings)
Requires	a mere modicum of creativity
Vests	automatically upon creation
Sustained by	<i>[nothing]</i>
Lasts	lifetime + 70 years; or 95 years
Theory	incentive to create; public goods problem

PAT.

Patent

Patent





US 6,302,230 B1

(12) **United States Patent**
Kamen et al.

(35) **Patent No. US 6,302,230 B1**
(41) **Date of Patent: Oct. 16, 2001**

(54) **PERSONAL MOBILITY VEHICLES AND METHODS**

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(51) **Int. Cl.** **B60K 21/00, B60K 20/00, B60D 65/00, B60Q 1/00**

(52) **U.S. Cl.** **380/271, 380/276, 380/271, 380(2), 349(44)**

(58) **Field of Search** 380(276, 170, 171, 21, 41, 440, 340(436), 441, 440, 439, 380, 590, 318(605, 604, 700, 380(481), 280(455.1), 280(175, 5, 20) H

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280,000,000		
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ABSTRACT

An automatically balancing vehicle having a headroom sensor. The headroom sensor determines the difference between the maximum velocity of the vehicle and the present velocity of the vehicle. An alarm receives a signal from the headroom sensor and produces a warning when the headroom falls below a specified level.

7 Claims, 16 Drawing Sheets



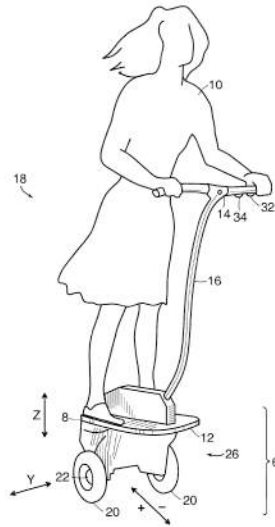


FIG. 1

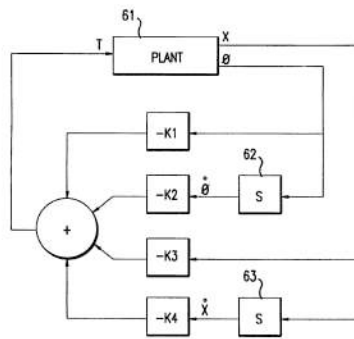


FIG. 3

1
PERSONAL MOBILITY VEHICLES AND METHODS

TECHNICAL FIELD

The present invention pertains to vehicles and methods for transporting human subjects. Typically, such vehicles rely upon a steering mechanism, being designed so as to guide such all terrain conditions of placement of their ground-contacting members. Thus, for example, the gravity vector acting on the center of gravity of an automobile poses a problem for the driver of such a vehicle. Another example is a manually steered vehicle or the state-changing vehicle described in U.S. Pat. No. 4,795,548 (Duchon et al.).

BACKGROUND ART

A wide range of vehicles and methods are known for transporting human subjects. Typically, such vehicles rely upon a steering mechanism, being designed so as to guide such all terrain conditions of placement of their ground-contacting members. Thus, for example, the gravity vector acting on the center of gravity of an automobile poses a problem for the driver of such a vehicle. Another example is a manually steered vehicle or the state-changing vehicle described in U.S. Pat. No. 4,795,548 (Duchon et al.).

SUMMARY OF THE INVENTION

In one embodiment there is provided a vehicle for carrying a user. In this case, the user is a standing person. The vehicle of this embodiment includes:

- a ground-contacting member which supports a platform including the standing person, the ground-contacting member comprising an inclining surface substantially at a single angle of contact; and
 - a motorized drive arrangement, coupled to the ground-contacting member, the drive arrangement, ground-contacting member and platform comprising a system, the motorized drive arrangement causing, when powered, automatically balanced operation of the system.
- In another embodiment, there is provided a vehicle for carrying a payload including a user. The vehicle of this embodiment includes:
- a ground-contacting member including two substantially parallel wheels;
 - a platform which supports the user in a standing position substantially across both wheels; and
 - a motorized drive arrangement, coupled to the ground-contacting member, the drive arrangement, ground-contacting member and platform comprising a system, the motorized drive arrangement causing, when powered, automatically balanced operation of the system.
- In another embodiment, there is provided a vehicle for carrying a payload including a user, and the vehicle of this embodiment includes:
- a platform which supports the user;
 - a ground-contacting member, to which the platform is mounted, which pivots the user in desired motion over an underlying surface;
 - a proximity sensor for determining the presence of the user on the device; and
 - a safety switch, coupled to the proximity detector, for inhibiting operation of the ground-contacting member unless the proximity sensor has determined the presence of the user on the device.

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The proximity sensor may be a sensor, mechanically coupled to the user's hands, having an operating position and a non-operating position, wherein the sensor is in the non-operating position in the absence of the user from the device and the sensor is mechanically in the operating position when the user is on the device. The sensor may include a glass, disposed within a device, for receiving a beam of the user, wherein placement of the foot on the plate causes it to move into the operating position.

Alternatively, the proximity detector may be electronic and may include a sensor/switch device. In a further related embodiment, the device may include a motorized drive arrangement, coupled to the ground-contacting member, the motorized drive arrangement causing, when powered, automatically balanced and stationary operation of the device unless the proximity sensor has determined the presence of the user on the device.

In another embodiment, there is provided a vehicle for carrying a payload including a user. The vehicle of this embodiment includes:

- a platform which supports the user;
 - a ground-contacting member, to which the platform is mounted, which pivots the user in desired motion over an underlying surface;
 - a motorized drive arrangement, coupled to the ground-contacting member, the drive arrangement, ground-contacting member and platform comprising a system, the motorized drive arrangement causing, when powered, automatically balanced operation of the system wherein the motorized drive arrangement has a present power output and a specified maximum power output; and, in operation, has balancing torque determined by the difference between the maximum power output and the present power output of the drive arrangement;
 - a balancing margin monitor, coupled to the motorized drive arrangement, for generating a signal characterizing the balancing margin; and
 - an alarm, coupled to the balancing margin monitor, for issuing the signal characterizing the balancing margin and for warning when the balancing margin falls below a specified limit.
- The alarm may include a light modulation of the power output of the motorized drive arrangement, and, alternatively, or in addition, may be audible.
- In a still further embodiment there is provided a device for carrying a user, and the device includes:
- a platform which supports a payload including the user;
 - a ground-contacting member, mounted to the platform, including at least one ground-contacting member and a driving a first drive plate;
 - a motorized drive arrangement, coupled to the ground-contacting member, the drive arrangement, ground-contacting member and platform comprising a system, the motorized drive arrangement causing, when powered, automatically balanced operation of the system in an operating position that is unstable with respect to tipping in at least a first roll plane when the motorized drive arrangement is not powered; and
 - a user input control that receives an indication from the user of a specified pitch of the device under conditions of system in uniform velocity.
- The user input control may include a hand-held displaced against a handle that is part of the device. A related embodiment:

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such as means members and elements of wheels are described in the prior applications incorporated herein by reference, and the term "wheel" is used herein to refer to any such ground-contacting element without limitation. The single wheel 44 of one embodiment of FIGS. 8 and 9 may be supplemented, as shown in FIG. 10, by a second wheel providing a pair of advance and control wheels 26. It can be seen that the vehicle of FIG. 10, the vehicles of various other embodiments disclosed in this description, when riding on wheels 26 for contacting the ground, is inherently unstable in the fore-and-aft direction with respect to a vertical Z. While the vehicle of FIG. 10 is inherently stable in the lateral direction, vehicles of some other embodiments are unstable in both lateral and fore-and-aft directions. The control of vehicle 10 may be controlled by output 10 shifting its weight, and that the center of mass (COM) of the loaded vehicle, in accordance with teachings described above.

Also, as described above, in addition to the direct effect of subject leaning, on the variables governing the torque applied to a motor for driving the vehicle, or as an alternate control strategy, user input may be separately incorporated into the control loop in a manner equivalent to variation of one or more of the input variables. Thus, for example, the user may provide an input, by means of a user interface of any sort, the input being received by the control system in response to a change, for example, in vehicle tilt. Such an interface may include, for example, a hand-held or a joystick mounted on the grip 14.

Referring again to FIG. 10, assuming vehicle 10 may be provided for user 10 shifting his weight laterally in the Y-Y' direction with respect to wheels 20. The change in position of user 10 relative to the platform 12, and/or the consequent lateral shift of the COM of the combination of user 10 and vehicle 10 may be sensed using any strategy. One characteristic is the use of one or more accelerometers disposed on the upper surface of platform 14 to sense differential pressure exerted by a first leg 52 of user 10 with respect to a second leg 54 of the user. Alternatively, a set of two sensors may be provided on platform 12 for supporting user 10, and one or more accelerometers mounted on the user may sense a shift in the weight of the user and generate a signal for controlling the velocity vector of the vehicle in response to user leaning. As an alternate example, a set of platform 12 relative to the axis (Y-Y') of rotation of wheel 20 may be sensed using an accelerometer, or one or more gyroscopes. Correction may be applied to the measured tilt of differential pressure to account for irregularities in the surface being traversed by vehicle 10, as determined by the measured tilt, with respect to a plane perpendicular to gravity, of the axis (Y-Y') of rotation of wheel 20. In accordance with the further teachings of the invention, a force sensor may be provided within handle 16. In a variation sensor may be provided at point 46, other strategies for sensing leaning by the user and adjusting the wheel steering as a user input to the control loop for governing vehicle operation.

In accordance with other embodiments of the present invention, leaning by user 10 may be used solely for governing fore-and-aft motion of vehicle 10, or, alternatively, leaning may be used solely for governing steering of the vehicle, or, for both functions.

A first perspective view of an alternate embodiment of the invention is shown in FIG. 11 where vehicle 10 is a single wheel 28 and user 12 stands, during normal operation of the vehicle, on platform 14 which, when 24. An embodiment is shown wherein handle 16 is rigidly attached to platform 14, in this case, via coupling 40.

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FIG. 11 shows an embodiment of the invention wherein a vehicle 28 is controlled by leaning, as described above with respect to other embodiments, and in which is provided, such that the center of mass of user 10 is for standing on platform 12. Within the scope of the present invention, as described herein and the claims are not intended to limit, user 10 may be supported on platform 12 by standing with feet positioned along axis 56 of rotation of wheel 24, as shown in FIG. 11, or, alternatively, with feet positioned on both sides 52 of rotation of wheel 24, as shown in FIG. 12 and FIG. 13. A handle 16 may also be provided in the case of a configuration of the invention in which wheel 44 is mounted transverse to the direction faced by user 10, with handle 16 coupled to platform 12 via coupling 40, as shown in FIG. 14.

FIG. 15 shows an embodiment of a vehicle wherein the ground-contacting member is a wheel 60. Such a wheel may be separately driven in the axial Z direction and the vehicle stabilized in one or both of these directions as the manner described above.

In addition to the personal mobility vehicles described and claimed above, in accordance with alternate embodiments of the invention, scaled-down versions of any of the embodiments, hardware described may be employed for recreational or educational purposes, whether or not human subjects are contacted therewith. Such systems may travel over various terrain while maintaining balance in the fore-and-aft plane.

The above described embodiments of the invention are intended to be merely exemplary and numerous variations and modifications will be apparent to those skilled in the art. All such variations and modifications are intended to be within the scope of the present invention as defined in the appended claims.

What is claimed is:

1. A vehicle for carrying a payload including a user, the vehicle comprising:
 - a platform which supports the user;
 - a ground-contacting member, to which the platform is mounted, which pivots the user in desired motion over an underlying surface;
 - a motorized drive arrangement, coupled to the ground-contacting member, the drive arrangement, ground-contacting member and platform comprising a system being tunable with respect to tipping when the motorized drive is not powered; the motorized drive arrangement causing, when powered, automatically balanced operation of the system wherein the motorized drive arrangement has a present power output and a maximum power output; and, in operation, has balancing torque determined by a difference between the maximum power output and the present power output of the drive arrangement;
 - a balancing margin monitor, coupled to the ground-contacting member, for generating a signal characterizing the balancing margin; and
 - an alarm, coupled to the balancing margin monitor, for issuing the signal characterizing the balancing margin and for warning when the balancing margin falls below a specified limit.
2. A device according to claim 1, wherein the alarm includes a light modulation of the power output of the motorized drive arrangement.
3. A device according to claim 1, wherein the alarm is audible.

Patent ^{PAT.}

Protects	machines, inventions
Requires	some level of cleverness (nonobviousness, inventive step)
Vests	after application, upon issuance by government
Sustained by	escalating maintenance fees
Lasts	up to 20 years
Theory	incentive to invent and disclose; public goods problem

Trade Secrets

Trade Secret



Trade Secret

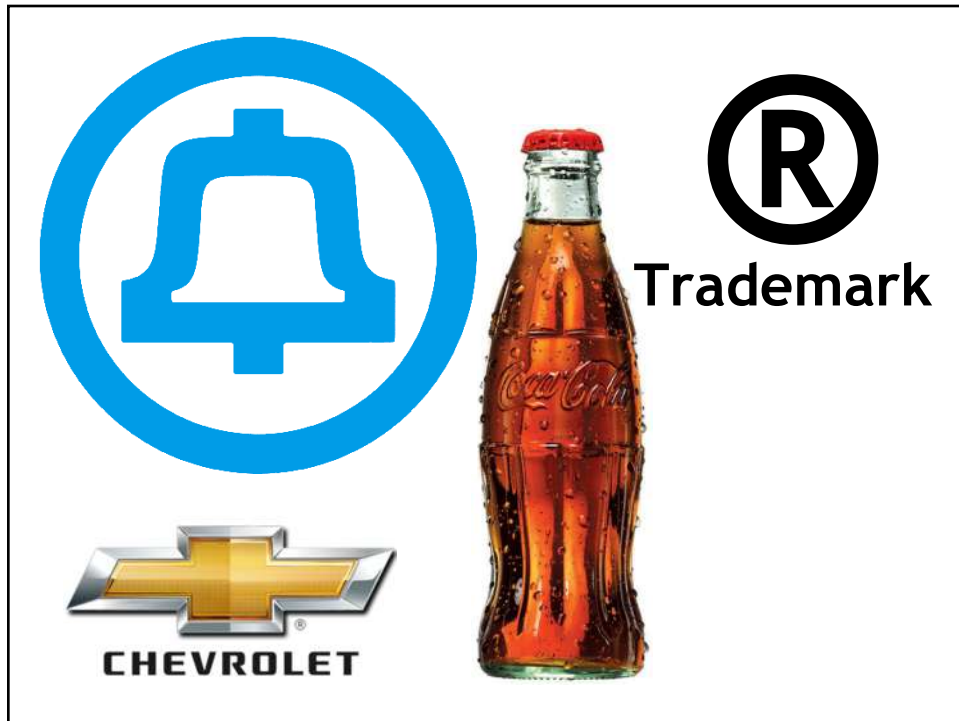
Protects	formulas, recipes, manufacturing techniques, and other intangibles with independent economic value
Requires	secrecy and reasonable efforts to keep secret
Vests	automatically
Sustained by	continuing secrecy and efforts to keep secret
Lasts	potentially forever
Theory	????



Trademark

TM

Trademark



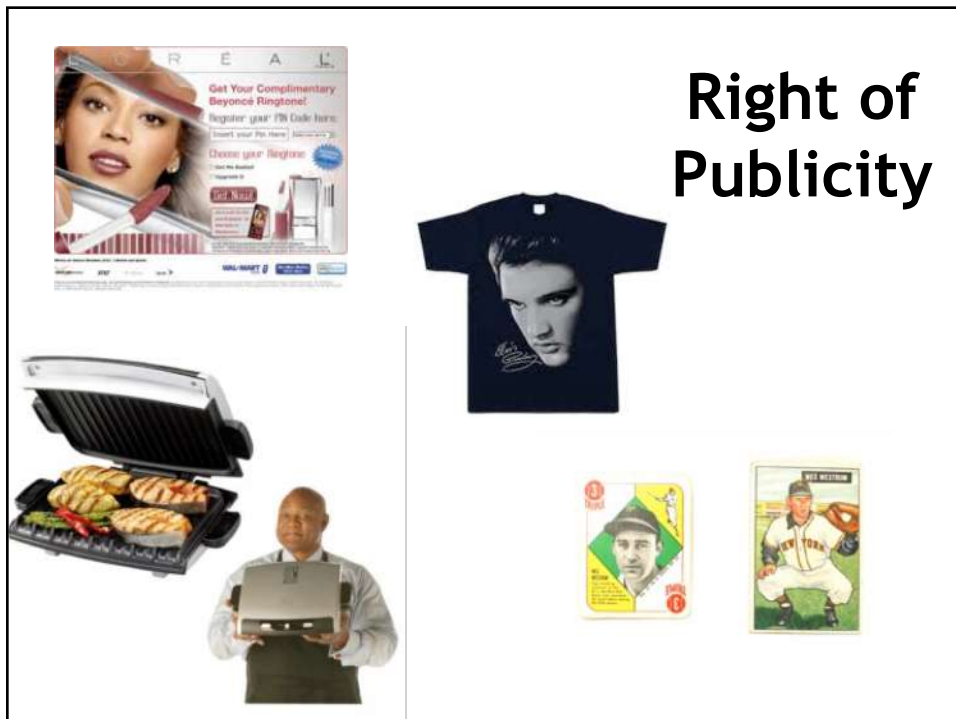
source

Trademark ® ™

Protects	names, logos, slogans, other indications of commercial source
Requires	distinctiveness (can identify a commercial source)
Vests	common law: upon use federal: after use, upon registration
Sustained by	continued use
Lasts	as long as used, potentially forever
Theory	provide information to consumers



Right of Publicity



Right of Publicity

Protects	name, voice, image, other indicia of identity
Requires	nothing; fame in a few jurisdictions
Vests	automatically
Sustained by	<i>[nothing]</i>
Lasts	lifetime; post-mortem in some states
Theory	????



You

own intellectual
property

Comparisons

What is protected?

©	Expression (text, images, recordings)
Pat.	Inventions (manmade)
TM	Indications of commercial source
Trade Secret	Transferrable commercial secrets
Right of Publicity	Indications of personal identity

What does it take to get it?

©	Fixation (immediate)
Pat.	Application, gov' t review
TM	Use in commerce, creating meaning
Trade Secret	<i>Nothing</i>
Right of Publicity	<i>Nothing</i> (fame, some places)

What does it take to keep it?

©	Nothing
Pat.	Payment of maintenance fees
TM	Continued use in business
Trade Secret	Keeping it secret
Right of Publicity	Nothing

How long does it last?

©	about 100 years
Pat.	about 20 years
TM	forever (if used)
Trade Secret	forever (if kept secret)
Right of Publicity	life + extra sometimes

How is it lost?

©	<i>Very difficult</i>
Pat.	Unpaid fees; successful challenge
TM	Failure to keep exclusive control
Trade Secret	The secret gets out
Right of Publicity	<i>Very difficult (?)</i>

Defenses include ...

©	Fair use, first-sale
Pat.	Invalidity, first-sale
TM	Non-trademark uses, fair uses, first-sale
Trade Secret	Reverse engineering
Right of Publicity	News, free speech, non-commercial

Remedies include ...

©	Injunctions; restitution (of D's wrongful gains); statutory damages up to \$150K per infringement
Pat.	Injunctions; royalties; treble damages
TM	Injunctions; punitive damages; treble damages
Trade Secret	Injunctions; restitution (of D's wrongful gains); punitive damages; royalties
Right of Publicity	Injunctions; punitive damages

the
LABEL

What is
“intellectual property”?

“intellectual property
infringement”


“intellectual property
infringement”

What is
“intellectual property”?

Is it
“property”?

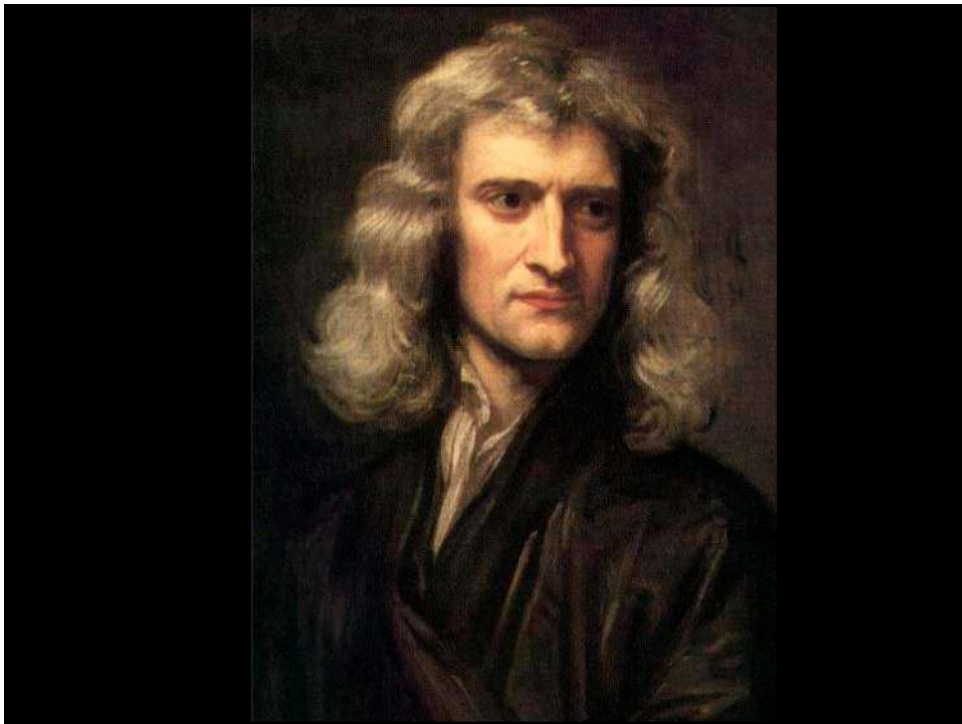
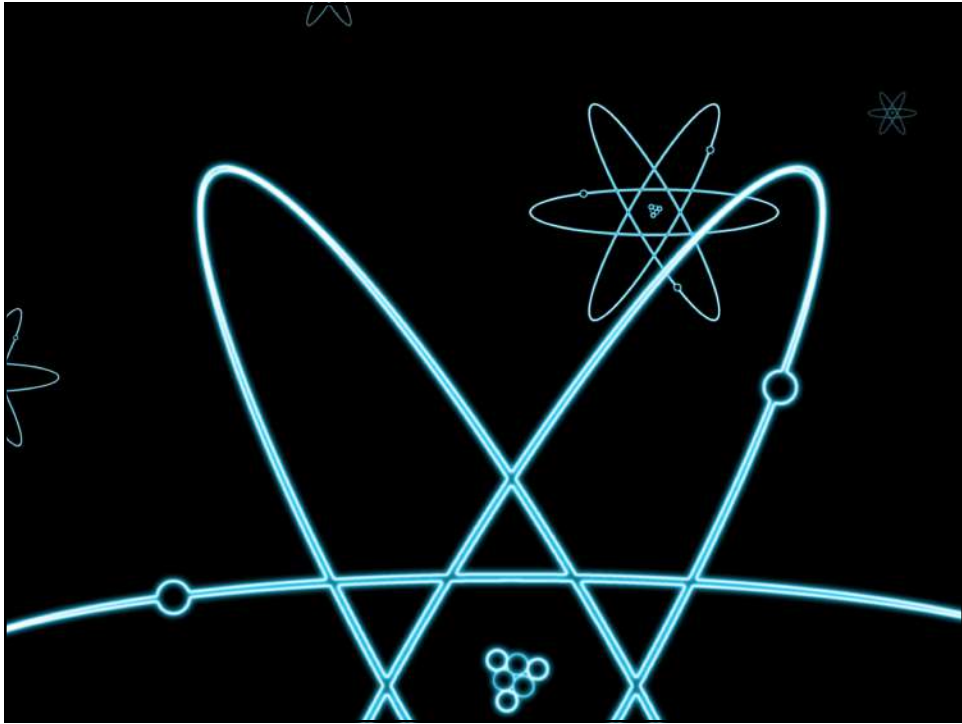
Is it
“property”?
It depends on who you ask.

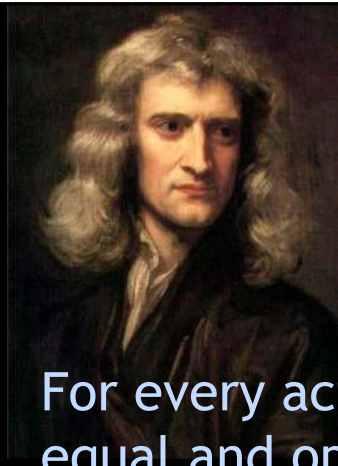
Is the right to receive
government welfare
property?

Is a professional license
property?

Is a government pension
property?

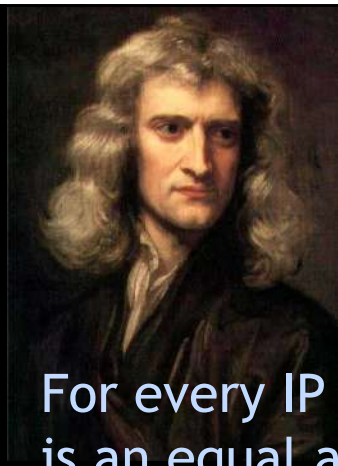
What's
"intellectual"
about it?





Newton's Third Law of Motion

For every action, there is an
equal and opposite reaction



Newton's Third Law of IP

For every IP entitlement, there
is an equal and opposite
reduction in freedom.

Why is
intellectual
property law
necessary?

Why is
intellectual
property law
necessary?

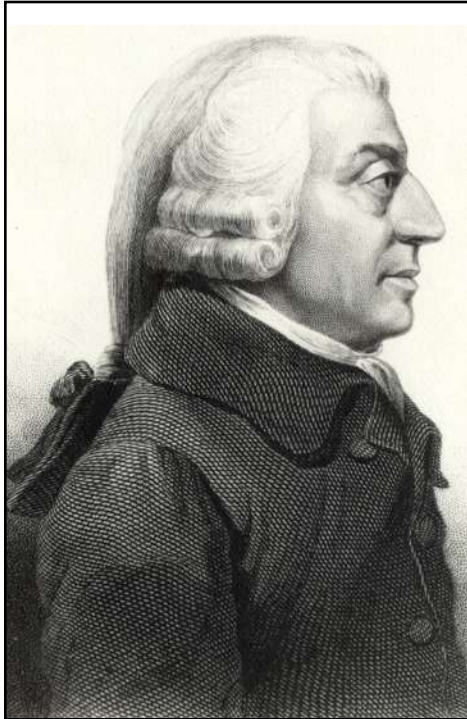
If it *is* even
necessary ...

Why is
intellectual
property law
necessary?

If it is even
necessary ...



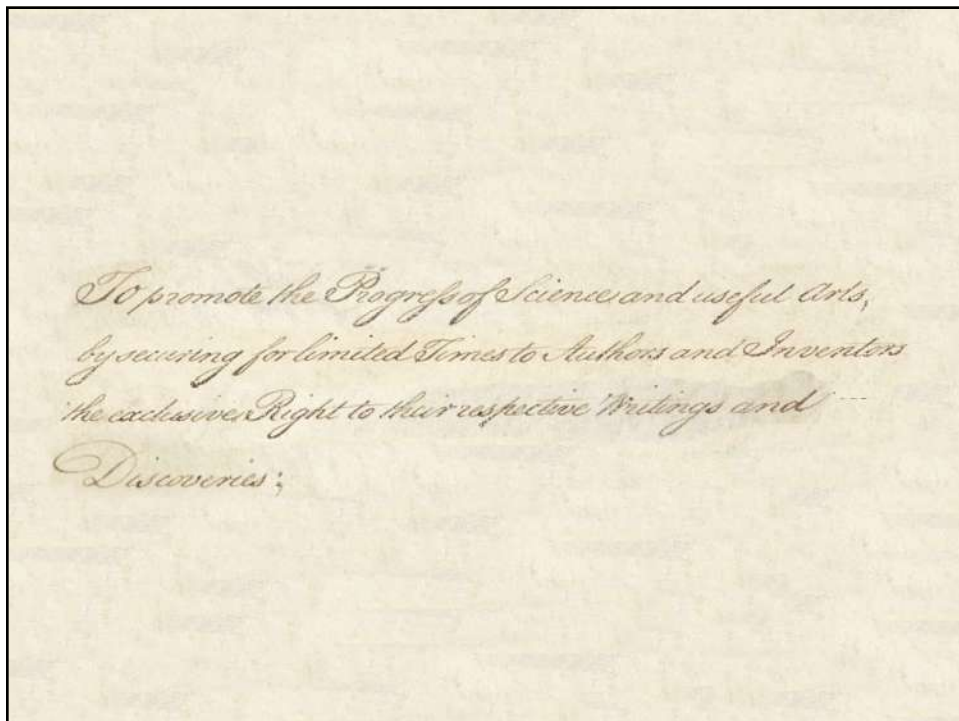
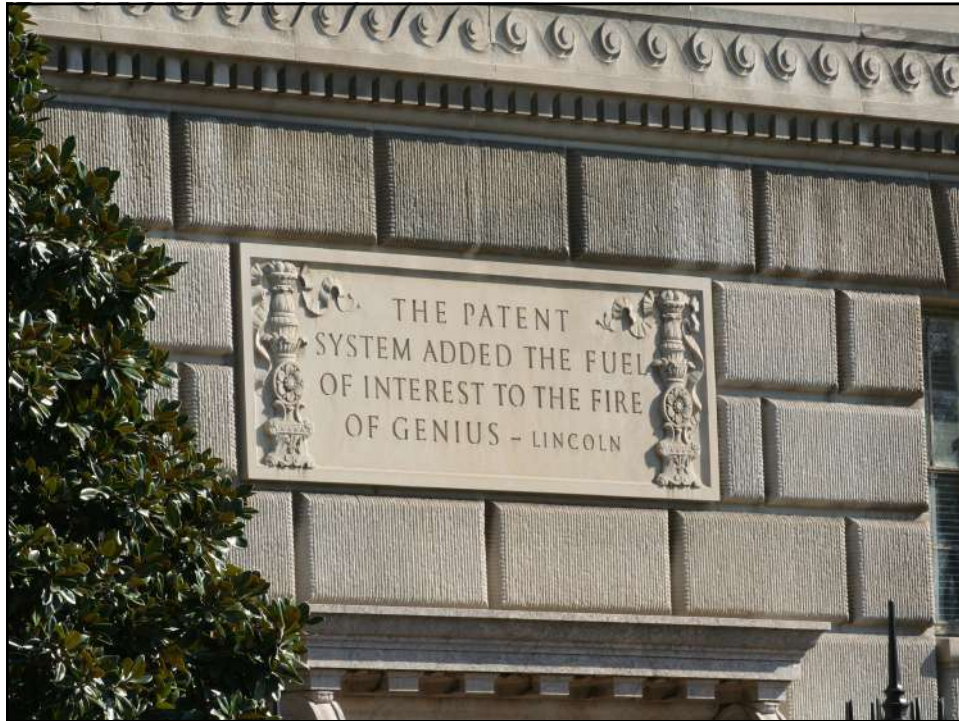
*Classical
Economics*



Adam Smith



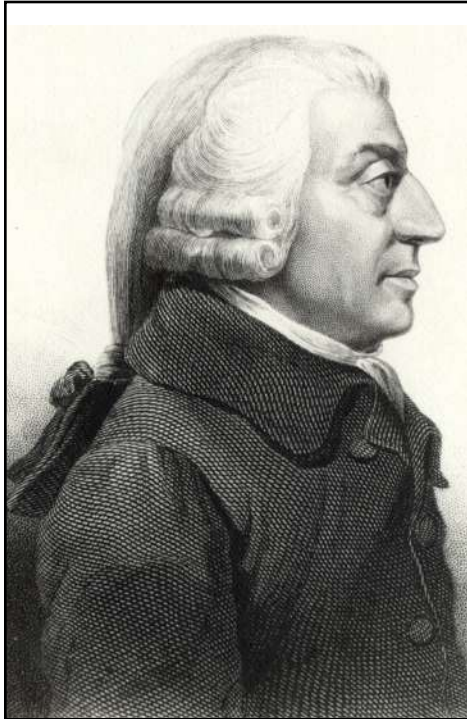




How did intellectual property law come to be?








Adam Smith

*To promote the Progress of Science and useful Arts,
by securing for limited Times to Authors and Inventors
the exclusive Right to their respective Writings and
Discoveries;*

raison d'être

d'être  **raison**

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