

No 1

Hydrostatis

1. What is the Distinction between
the terms Liquid and Fluid?

2. Is the quantity of fluids decreasing
on the surface of the globe? — The
Ball is said to decrease fifty inches
in a century — It is alleged that
there are evident marks of the seas
being having risen several
times since formerly Near
that water is convertible into
earth. &c

3. Why does ~~the~~ a fluid
when frozen increase in bulk?
— Lead pipes burst when frozen
bottles — trees are split — a
— Cannon was burst by the freezing
of the water with which it was filled

4. What article combined with spirits will destroy the power of the Hydrometer? — Symp —
5. If every body weighed in water loses part of its weight, how comes it to pass that water weighs as much in water as in air —
6. When a Stone is thrown into water in the waves formed below the surface and if so what analogy do they bear to those on the surface?
7. What is the cause of the whirl called a Vortex? Will there be a spiral formed in a vessel of water at rest?
8. With what velocity does water issue from a hole in the bottom

of a vessel is it that which a body
acquires by falling thro' the whole or
thro' only one half the perpendicular
altitude or in some other ratio.
— What is the best method of
ascertaining this?

9. Best form of a sea gauge —
10. The inclined pump well calcu-
lated for drawing the foundations
of buildings —

11. The chain pump more complete
and liable to more accidents than
the inclined pump —

12. To every hydraulic apparatus
there should be added models of
all the different kinds of valves

13. What is the best method of hoisting
and taking up any thing in
water?

14. In a sucking pump the piston

should work near the bottom, when
it works high the smallest un-
der will prevent the action of the
pump.

13. Suppose a hole made in the
base bottom of a cylindrical
vessel which is half an inch
thick - If the lower part of the
orifice is dry, the quantity of water
discharged will be less if it is
said by $\frac{1}{3}$ than if the hole had
been water.

16. If the finger be held on one leg
of a siphon and the other leg
immersed in a vessel of water
piped to the brain, the siphon
will act without extracting the
air, on withdrawing the finger.

17. When a number of small vessels

empty themselves into a large
supposing both full; whether
is the fluid accelerated or retarded?
— What happens when the fluid
~~is not~~ moves in the contrary di-
rection?

18. How far is a wave in water af-
fected by the figure of the stone?

19. If a screw is to water as far as
possible and consequently the water
compressed in the vessel what is the
reason that a ball moves with
the same ease as when the water
suffers no such compression?

20. It is affirmed by some that the
resistance to a cone moving
in water is the same when drawn
by its apex and base.

24. The Chinese pump is a kind
of inclined chain pump - It is
composed of a bottom and is driven
by wood a wooden chain with
flat pins in the form of redoubt
placed on the chain a wooden
pulley is placed at each end
round which the chain moves
as in the common chain pump
The lower half of the valves draw
up the water the upper half
is supported on two polished
pins of bamboo - Two wheels
are placed on the axis of the upper
most pulley to which two chains
or handles are applied - and it is
remarkable that the handles
are placed at right angles to
each other

Some think this pump is wrong.

by the feet projecting pieces in front
to the upper pulley on which a
man tread. There is always
one joint between each wheel

22. A bucket wheel for raising water may
be constructed at a small expense
by Bamboos.

23. It is demonstrated in the preceding
that the resistance to a globe and
cylinder moving in water is the same
if their orthographic sections and motion
be the same —

24. If a prism or cylinder vessel
be filled with water and an aperture
be made in the bottom, the quantity
of water discharged will be the
half of what would be discharged
in the same time if the water is
kept at the same height. v. h.
The experiment was made in the fair sea

25. The Court must at present call the
whole business of Physic, and Physic
Hydrodynamics, a very proper
appellation - In England the
word Hydrostatics is used for the
whole -

26. M. Canton found water most compressible when cold, & rises of wine when hot.

27. In the bottom of a tin plate make a number of small holes. Put the neck with a light cork just into the vessel, which open and shut alternately -

28. Water enlarges its bulk about $\frac{1}{167}$ from 60° to 100° of Fahrenh. Ther.

29. Specific gravity of fluids may be measured perhaps best by weighing them in a vessel with a long narrow neck or stem -

30. The Hydrometer should be prepared below its point of Equilibrium in the sp. ^{of fine}

N^o 1

Pneumatics

air will be produced which may
be used for magnezine as one has
found to Mr. Wilson of Sheffield. It
owing to this circumstance that soon
comes a single stroke of the piston
will charge a ball which was not
previously half filled —

7. The condenser of air from should
be made of sheet iron bowed out of
the side — The magnezine may
also be made of sheet —

8. The barrel of an air pump
should be screwed down on the
plate not made fast as is some
times done by the upper screw of
the pillars. —

9. A receiver with a bladder to
lose on both ends shows the
spring and pressure of the air —
in operation in a satisfactory
manner —

The experiment of the bell in the exhausted receiver may be varied by making the bell touch the receiver when the sound will be heard.

Will the same quantity of air when rarefied produce any change on the barometer? - Height of a lot of air -

When the perpendicular height of a lot of air is increased by heat the pressure is lessened because the upper part is spread over a greater surface.

Whether should the Barometer be highest in small Islands or large continents? -

May not the power of the air gun be greatly increased by heat?

In charging an air gun care must be taken not to work the condenser too hard otherwise a quantity of air flows

and does (with Mercury soon
inhibit the air again?

14. The bar Gauge of an air-
pump is divided by filling the
Gauge with mercury then with
certain proportions by weight
to ascertain the different divisions

15. Linted oil boiled up to a
certain consistence is the best
substance for a collar of leather
or any junction on the air-
pump.

16. The air rushes up the chimney
during the day and down during
night was in a room which has
not a fire in it. — (Franklin)

Smoke is about half the weight
of Atmosphere air - proved by
the smoke's being to descend when
the receiver is half exhausted
The above prop^s may be at
so proved from observation on
the sides. The smoke did not
ascend but moved off sid, with
height about 3 miles = $\frac{1}{2}$ part
of the Atmosphere
Air pump with Gasp Barrell's
for shewing the action of the
instrument - — Paris - 1700

Steam rushes into a vacuum
with the velocity of 1200 feet p^r
second, same as the velocity of
sound - —

The Mercury in the gauge of
the air pump should be locked

20. The heat of boiling water increases the Elasticity of air in the proportion of 10. to 34 That is the increase of Elasticity is to the Heat in its natural state as above —

21. In England the expansion of air in the heat of summer and in frost is as 7 to 6. At Petersburg air ^{at} boiling point, summer heat & winter cold are as 6. 4. 3 respectively —

22. The Expansion of hot steam may exceed the force of Gun Powder more than 30 times —
— visible —

23. The velocity of sound may be ascertained more accurately since the measurements on Blackheath to Dover than could be done before
Discharge a 24 or 32 pounder on wheels a quantity of blue beads are put from an orifice and let it be heard and observed at as many of the Stations as possible and observe the intervals, with the state of the air wind &c —

There are two methods of ascertaining
the specific gravity of Air —

- 1st by weighing a quantity of it in a balance
2. To use a glass tube open at both ends
into the neck of a bottle in which a
small quantity of water is put condense
the air in the bottle a little so that the
water may rise in the tube. Then empty
this apparatus as before. It will be found
that at the height of 54 feet the water has
ascended in the tube $\frac{3}{4}$ inch. Consequently
54 feet of air = $\frac{3}{4}$ inch water or water is to
air as 864 : 1 —

Water vapor condensed air into 1551 times
the less space than it naturally occupies, by
water forced into an iron globe and poyer

— Nally into 600 — Boyle 30 Atmospheres
The elasticity of air not much different from
its natural state is inversely as the space it
occupies

— When compressed into a space 4 times less
than it naturally occupies, the air does not
vary inversely as the space occupied but the variation
increases in a greater proportion — The law must be
limited, for in contact, it becomes incompressible

2

1. Does any change take place in the pitch of a note in rarefied and condensed air?

2

2. Why does not a vibrating string or ~~rod~~ in a drum resemble the flame of a candle?

2

3. Can the prismatic green be obtained decomposed? If so, how?

2

4. May not the diminution of sound be owing to the presence of the atmosphere or the receiver which prevents the vibrations?

5. When a Diotem and a flute are perfectly in unison, the flute trembles under the fingers.

6. The water in a Musical glass moves round in waves with the fingers.

No. 11

Journal

Is there any reason founded on
the theory of music for the present
form of the Mersenne's Bridge?
When a bit of paper is put
on the string of a violin and
another string unison with the
former, is sounded, the paper
flies off - Explain these tones

In what manner do solid bodies
increase the sound of vibrating
strings? What is the best form
for that purpose? -

Why does the addition of water
deepen the tone of a musical
glass? -

A Mersenne's Bridge it is alleged
cannot be turned properly by
means, for as the tone depends
on the diameter as well as on the

22. If the vibrations of the air ^{comes}
ground, after it has passed thro
so long an Auditory passage, what
would be the consequence if the
of the ear was touched? It would prob
ably ~~be~~ feel like the Quaking
of a cannon - Clap of thunder -

23. Mr. Cartwright proposes a new
construction of the musical Glasses
- Glasses hollow in the Shank.
Hollow tube with a fixed axis
within, turns round and carries
the rubber round the base of the
glass. On the top of the fixed
axis is a circular piece which
is pressed with the finger on the
rubber - Given - will not the rub-
bing of the glass on different parts

An Organ pipe when shut at
top sounds the lower octave to its
open note - game Does this obtain
in pipes of all dimensions?

The best organ pipes are of
wood, metal and lead.

The best wood for organ pipes
is deal free of turpentine

Wooden pipes are turned with
wooden stoppers covered with leather
metal pipes with metal cones

A composition of lead and tin
forms the best metal for organ
pipes

Every pipe has a stopper to
regulate the quantity of wind -

26. A Hummer can thro' ever so much stretched will not produce a musical note - Given is the owing to the fibres, or to the want of Elasticity?

27. If the cardita Philosophica be held in the mouth of a large jar it gives a humming noise -

28. A ~~glass~~ ~~house~~ in the form of a circle would be an improvement ~~for~~ ~~observing~~ ~~the~~ ~~stars~~ ~~of~~ ~~all~~ ~~climates~~ -

28. What is it in sound ^{besides the pitch} that enables a blind man to distinguish one instrument from another? A note on a Violin is easily distinguished from an unison to it on the flute without seeing the instruments -

and at different times, from some
times incompatible with the note
and the position of the strings? —

May not the ear receive the
same assistance by Instruments
that the eye does? converse with
a friend at a distance, without a
person between hearing a syllable
of what is said — Sounds reflected
from a mirror — reversed by a
mirror — Concert by Reflection
perhaps more perfect than the
common concert —

If two concords and a discord
be struck at the same time
the concords will be heard at
a much greater distance than
the discord —

heard at the opposite end of the
stick, a proof that the supple
has the principal share in pro-
pagating the sound -

35. Might not an organ be built
on the principle mentioned in
the last article - to communicate
its sounds by means of sticks from
one room or one house to another

36. Polishing a fork does not render
the tone sweeter - sometimes the
reverse - But sometimes sweetens
the tone -

37. To give a French string its best
effect it ought to be strained with
nearly as much tension as it
will bear - guess - why

38. The tension on a whole string

Can a sound be conveyed thro'
a vibrating string?

Sounds of musical forks not in
proportion to the quantity of matter

Tone is sharpened by taking off
either at the extremity, or sides of the
extremity - Finest at the extremity

If a fork be split into two forks

They are unisons

A less stroke is requisite to excite
a tone in a large fork with the
prongs 3 inches in length and half
an inch square, than in the stem
of a violin

If a fork be fixed on ^{one} ~~the~~ end of a
stick and the other end placed on
a board, the fork when touched is
heard

53. In several experiments on an
Convit it was found to be the
only of the convit which sounds
If the hammer remains on the
Convit, or the end of the horn
touched, the sound ceases —

54. One great advantage of metal
tones is that they can be damped
all at once; whereas a long string
being divided into several concord
continues to move for some time
after the damper has been applied

55. Who first discovered the quantal
ties of the notes in the diatonic
scale, and by what experiments
were they first settled? and when

56. In blowing into a flute, if the

chord is sometimes upwards
of thirty lews. —

When a fifth to the key is struck
as shown in the lecture above is
generated, even tho' the string
sounding that note be prevented
from moving — (curious fact!
What is a semitone, and can its
quantity be ascertained? —

Temperament an apology for
the imperfection of the instrument

2. Can musical tones be produced
by blowing air into a common
bottle?

3. A musical instrument may be
made of forks similar to the glasses

4. Two forks an incomparable shake.

~~Some other things~~

45. What is the reason that a fork
applied to the table has its tone
sometimes not allowed, sometimes
(diminished), but generally aug-
mented? — Aerial — Supported for

46. Oak the best wood for supports
to forks — Deal which is best for
violins, is worst for forks —

47. The swell on a fork incomparable
finer than on any other instrument
— given the best practical mode
of producing the swell? —

48. Composition for forks? — Iron
Steel — Copper — Brass — mixed
metal — wood

49. In tuning we from habit al-
ways make the octave downwards
too flat and upwards too flat

The musical Stone in China

An Anvil gives a shrill tone
part only, vibrates. Did the whole
move it would give a very grave
tone — — Pythagoras —

A Gentleman who plays in con-
cert on the Violoncello, says that
he tunes his instrument half
a note higher than concert pitch,
and yet this produces no harshness
in the performance — (Does not
this prove that there is no such
thing as temperament? May it
not also serve to prove that
there is great degrees of nicety in
tuning are not absolutely neces-
sary?)

53. In several experiments on an
conoid it was found to be the
only of the conoid which sounded
If the hammer remains on the
conoid, or the end of the horn
touched, the sound ceases —

54. One great advantage of metath
lones is that they can be damped
all at once; whereas a long string
being divided into several concord
columns to move for some time
after the damper has been applied

55. Who first discovered the quant
ties of the notes in the diatonic
scale, and by what experiments
were they first settled? — and when

56. In blowing into a flute, if the

note be heard a little sooner
and you blow a little stronger
you sound the Oct: above to the
first note — gun the same —

— also what is the proportion of
the velocity of the latter, ^{to} that in the
former case? — Is it double?

Can you make no distinction
between the Major and Minor tone
— Gun how is this distinction
proved and rendered sensible?

May not sounds from musical
forks, or air tubes be increased by
tubes?

What was note on organ pipe sounds
when open it will sound the lower
octave when shut, or when of double
the capacity — 11 — 2 —

60. Waves of sound have these properties

1. Propagate equally in all directions
2. Diminish inversely as the Distance
3. All move equally fast — $\text{Space} \div \text{Time} = \text{Velocity}$
4. Arise from the same body Equidistant
5. Intersect without disturbing each other

61. Sounds differ in Strength and in low

Strength or loudness depends on the magnitude of the stroke or quantity of matter in the pulse, $\text{Motion} \div \text{Resistance} = \text{Strength}$

under the density and breadth of the pulse

— Tone depends on the duration of the

~~stroke~~ stroke or interval between the

pulses. — The longer the interval the greater

the tone —

— Now all sounds from the same body

must be of one tone — also that

all the parts of sounding bodies which

perform their part in equal time have

the same tone — Bodies which vibrate

slowest have the deepest tone —

Journals

No 2.
Sey. Canal -
1^o Nov. 1793

2. Let a small bell be enclosed in a receiver
air tight and full of air, place this in
a larger vessel and exhaust the air from
between them, bell not heard since
poured does not pervade a vacuum -

3. All condensing bodies are electric - Bells
cracks with dust on them - Things by
communicate motion to the surround-
ing air -

4. Every point of ~~vacuum~~ a perfectly elastic
body equally stretched will return to
the air in at the same instant of time

5. In a short show any application of force
to produce a vibration is communicated
almost instantaneously to the whole
the thing therefore vibrates uniformly in
all its parts - But if the thing be
long and it be touched by the middle
then the middle part will move
before the others &c - waving suspension

66. Sound is heard much farther in dry than
in wet weather - when the Bar is high &
when it is low - In fact - In a summer
evening, than at mid day - In one ex-
p. time, than filled with people - Stronger
at the bottom than top of a mountain
In a mine or during bell - much
augmented through a long tube -
- farther on sea than on land - A
whisper heard at a much greater distance
through a ^{long} tube than the voice -
- Sound excited in one form of air displaces
all reflected to the other - Ear augmented
sound - Sound augmented by volume
The sound very noisy with ear flaps
solid substance - Accidents on a board

67 Velocity of sound by Experiment 2114
feet per second - Same by Calc. Newton

68. Sound in passing over rough surfaces
is not altered in tone, but decreased in
intensity - The ^{velocity} tone depends on the state
of the air, but, but various vibrations from
rough surfaces decrease

Each, Lambert and other Philoso-
phers of the continent maintain that
sound moves only in straight line
and they adduce echoes as a proof
of it. The echo say they is only heard
in one place or situation with regard
to the original sound. It arises from the
angle of incidence being equal to the
angle of reflection — But an echo
will happen if the sum of the lines
from different surfaces to the recipient
and final point be equal. — In an
ellipse it is the most perfect when
the original sound is in one focus,
the echo is then in the other —
Then the distance of the sum of the
lines and the direct distance must
not be less than 127 feet —

70

Vibrating Chords

Let L = length T tension D diameter
and V number of vibrations in a given time

Then,

1. $V \propto \frac{1}{L}$

2. $V \propto \frac{1}{D}$

3. $V \propto T^{\frac{1}{2}}$

If V represent the length or time of one vibration then

$V \propto L$, $V \propto D$ and

$V \propto \frac{1}{T^{\frac{1}{2}}}$

71

In a musical chord which is not much drawn and the weights are \propto Distances therefore all the vibrations are performed in the same time

72

A set of tones following each other which produce pleasure is called melody. A set of co-temporary tones which are pleasant to the ear produce harmony

73.

The Natural scale of music consists of seven intervals as follows

	1 st	2 ^d	3 ^d	4 th	5 th	6 th	7 th	
R	$\frac{9}{9}$	$\frac{9}{10}$	$\frac{15}{16}$	$\frac{40}{9}$	$\frac{9}{10}$	$\frac{9}{9}$	$\frac{15}{16}$	Oct

The lengths of the same chord to sound the
notes of the natural ^{scale} are to the whole ~~chord~~
chord as base as follow -