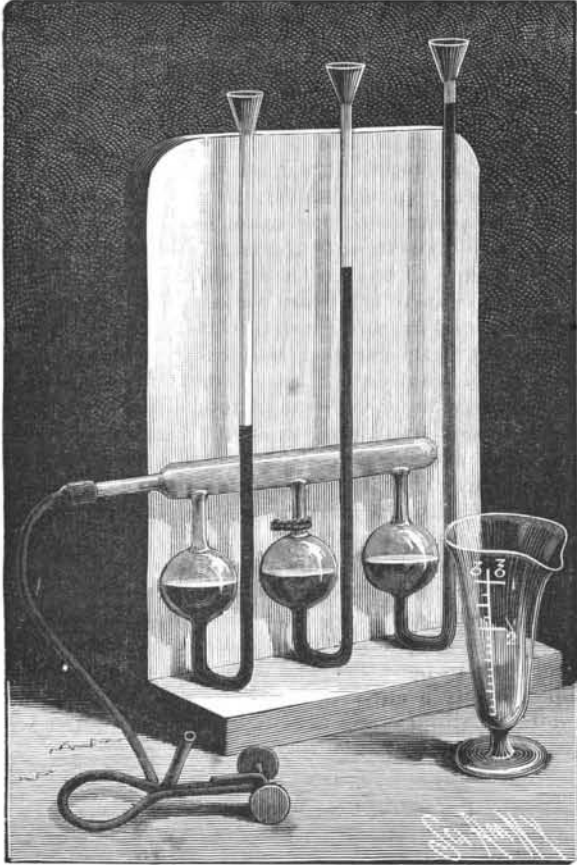


**THE YACHT THISTLE.**

This new yacht, constructed in Scotland with a view to competing for the world's prize cup, now held in New York, arrived at this port on the 16th of August, 21 days from Gourock Bay on the Clyde, whence she sailed July 25.

The vessel attracts much attention, and opinion is about evenly divided as to whether she will be able to



**THE EQUILIBRIUM OF COLUMNS OF LIQUIDS OF DIFFERENT SPECIFIC GRAVITIES.**

beat the Volunteer, the new yacht with which it is expected to compete for the great prize in October next.

We give from the *Graphic* several views of the Thistle as she appears in different positions. These are from photographs, and in connection with the large engraving given in the *SCIENTIFIC AMERICAN* of July 2 last, will give a fair idea of this remarkable vessel. In nearly all of the several races the Thistle has sailed in England she has been the winner. The following shows the dimensions of several of the fastest yachts, as given in the *New York Tribune*:

	Thistle.	Volunteer.	Mayflower.	Galatea.	Priscilla.	Atlantic.	Puritan.	Genesta.
Length over all....	112	107	100	100.6	95	95.1	93	96.5
Length on w. line..	85	85.10	85	86.10	83.3	83.4	81.1	81.6
Beam.....	20.3	23	23.64	15	22.8	23.10	22.6	15
Beam at w. line....	20	23	23.3	15	22.2	23.2	21.6	15
Depth of hold....	14.2	10	10	13.3	9.4	10.6	9.6	11.9
Draught.....	13.8	10	10	13.6	9	9.10	9.3	13
Area mid sec.....	15	96	92	125	92	102	88	115
Mid section bow....		0.60	0.60		0.60	0.64	0.58	
Mast, d. to hou....	62	65	63	53	61.9	63	60	52
Topmast.....	45	48	46	47	48	48	44	44.6
Boom.....	81.6	84	80	73	80	78	76	70
Gaff.....	50	52	50	45	48	48	47	46
Bowsprit outb....	38.6	37	38	36.6	39.7	38	38	36.6
Spinnaker boom...	70	70	67	65.6	66	70	65	64
Displacement.....	135	116	110	157.6	115	120	102.5	140
Inside ballast....	10	10	14	6	47	15	12	5
Keel ballast.....	55	50	37	72		47	32	63
Sail area.....		9,000	8,634	7,505	8,500	8,100	7,370	7,150

**APPARATUS FOR ILLUSTRATING THE SPECIFIC GRAVITY OF LIQUIDS.**

BY T. O'CONNOR SLOANE, PH.D.

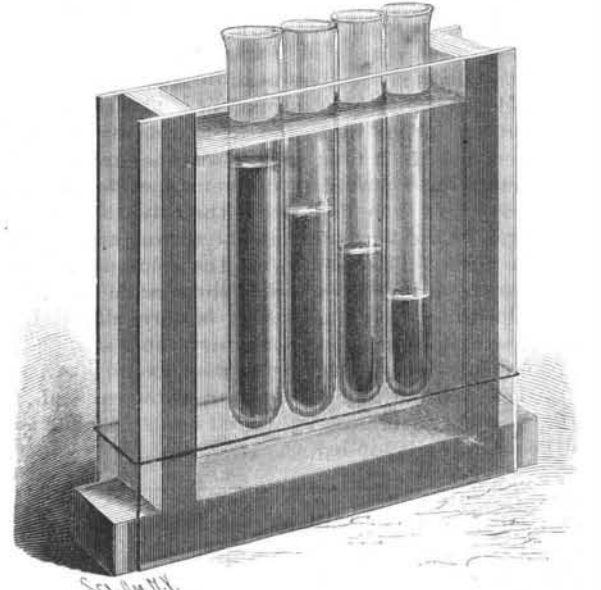
The law of the equilibrium of communicating columns of liquids of different specific gravities is that their height varies with their specific gravities. Thus a column of mercury one inch in height will sustain a column of water over thirteen inches high. This can be very easily illustrated by a bent tube, of the shape of the letter U. A little mercury is poured into the bend, so as to fill it. Then if water is poured into one limb it will rise thirteen times as high as the mercury, both measurements being referred to the surface of the mercury under the water as a base. Other liquids can be substituted for mercury. Although they may tend to mix with the water, the diffusion is so slow that the experiment can be performed with some satisfaction.

This arrangement is only adapted to show the experiment with two liquids. An apparatus is shown in the cut by which the same is illustrated for three liquids. The same apparatus can be made to show it for any number.

The glass portion is made in one piece. The horizontal tube may be one-half inch in diameter, the small bent tubes one-eighth inch internal diameter, and the bulbs, in this case, should then be at least one inch in diameter. The tubes from bend to top should be about seven inches long. This gives a small apparatus. With advantage it could be made very much larger. The great point to be kept in mind is that the bulbs should be eight or ten times the internal diameter of the tubes. The whole may be mounted on a simple wooden stand. One end of the horizontal tube is closed; the other is provided with an open extension of diminished size, so as to receive an India rubber tube. A pinch cock for closing the latter is provided.

Liquids of different specific gravities are now poured

into the respective tubes. The upper ends of the latter are slightly expanded, so as to form little funnels. Enough liquid is poured into each to rise to or slightly above the center of the bulbs. The pinch cock is now opened and the experimenter blows into the rubber tube. The liquids at once rise in the tubes and sink in the globes. This rising and sinking is in exact proportion to their specific gravity. Owing to the large size of the bulbs, they sink in them very little compared to the amount they rise in the tubes. The effect of this is that in the bulbs they preserve almost an exact level with each other. But in their rising they vary widely.

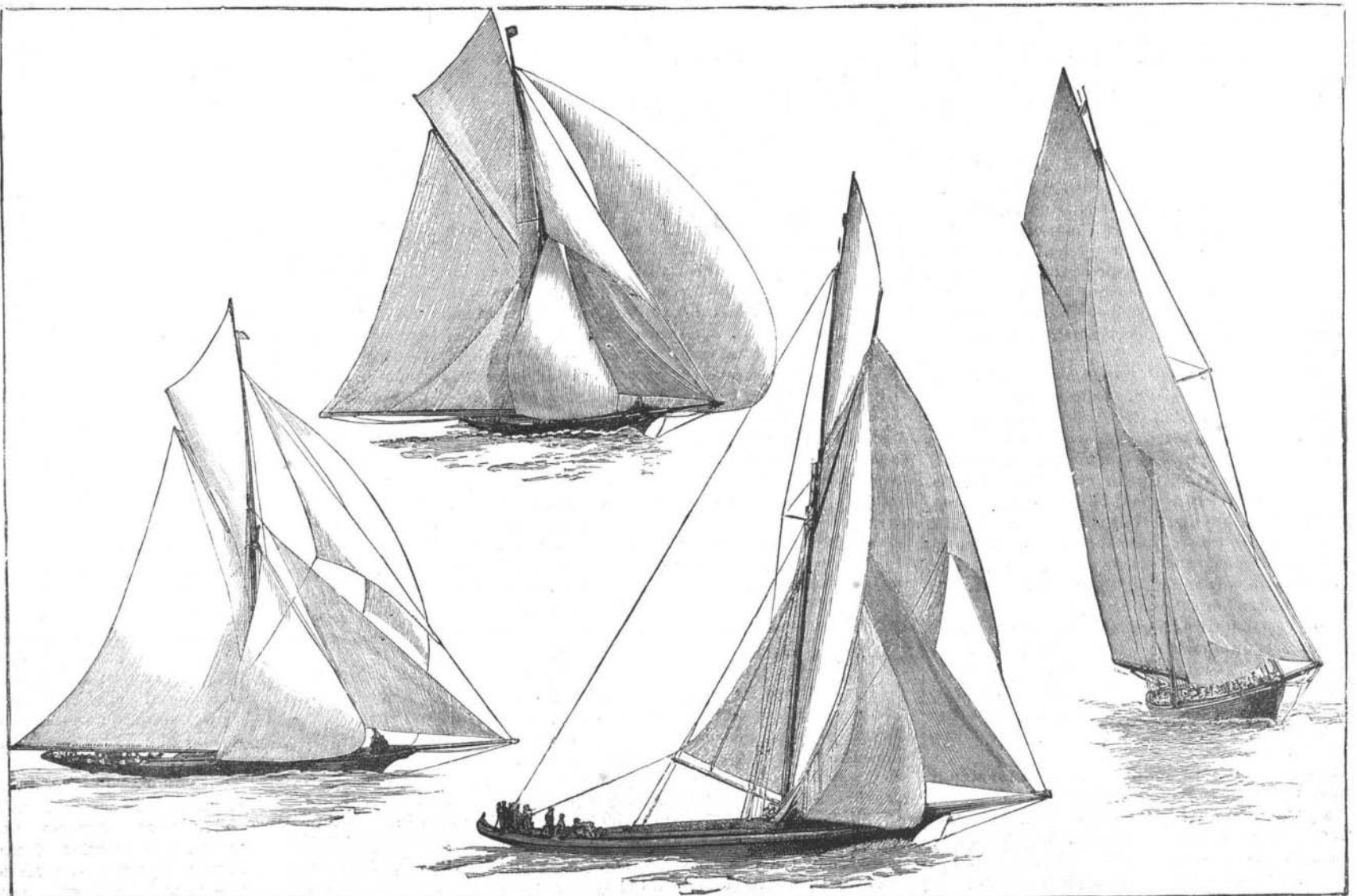


**FLOTATION OF LIQUIDS OF DIFFERENT SPECIFIC GRAVITIES.**

As soon as the lightest liquid reaches the top of the tube, the pinch cock is closed. Then the different columns remain stationary, all exerting the same pressure, though of different heights.

Concentrated sulphuric acid may be used as the heaviest liquid. It has a specific gravity of 1.84. By diluting it with varying amounts of water, lighter liquids may be produced, and water may serve for the other extremity of the scale, or alcohol may be used as a still lighter fluid. If a heavier fluid is desired, a solution of boro-tungstate of lime or of iodide of mercury in iodide of potassium may be used. The first of these may be made 3.6 times as heavy as water.

By making the apparatus smaller it will afford an excellent lantern slide. In this case it should not be mounted on a board, as shown in the cut, but may be held in a clamp or even in the exhibitor's hand in front



**THE THISTLE IN VARIOUS POSITIONS.**