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DESCRIPTION OF AN APPARATUS

FOR

TRANSFERRING GASSES OVER WATER OR MERCURY, &c.

BY THE REV. GILBERT AUSTIN, M.R.I.A.



READ, JULY 4th, 1803.

THE difficulty of transferring gasses from one jar or receiver to another, without loss, or mixture of atmospheric air, by the common mode in the pneumatic apparatus, must have been experienced often by philosophical chemists. And this difficulty is increased when very large jars are used, and when the production of gas in them is inconsiderable; as when oxygen gas is obtained from vegetables exposed to light, or from the decomposition of water. Of the small quantity, obtained in this manner, a portion is often lost in transferring it into a smaller jar for the purpose of subjecting it to examination; and the result of the experiment is rendered uncertain, if the object be to measure the quantity. In order to obviate this inconvenience, I beg leave to submit to the Royal Irish Academy the description of a small apparatus, which I have

found to answer well, and conceive may be admitted as a useful instrument into a philosophical laboratory.

The principal part of this apparatus consists of two pieces of plate glass, with a hole of about half an inch diameter drilled through each. They should be something broader, and about twice as long, as the diameter of the jars used in collecting and transferring the gasses. The holes should be disposed as in the figure. That in the plate (Fig. 1.), marked (*a*), should be nearly in the middle of the piece. The hole in the upper plate (*b*), near the extreme edge. The upper plate is shorter than the under plate, and its edge is ground fair and straight, so as to fit the edge of the *third* plate, which is not drilled, and should be a square piece cut off the second plate, as it is very necessary that these two plates should be of the same thickness. The length of these plates together should exceed that of the under plate about an inch. It is rather better to grind the polish off the plates with a little fine emery, as they slide more equably over each other when so prepared. All the jars to be used with them should have their mouths ground on a flat plate with fine emery. Things being thus prepared, the transferring plates may be used in the following manner, particularly when the jars for collecting the gasses are large.

When the jars, inverted in the usual manner in the pneumatic trough, are filled with the gas in any proportion, the two plates (*a* and *b*) are laid over each other in such a situation, that their holes shall not coincide; they
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are then plunged into the water, and the plate (*b*) applied to the mouth of the jar, and that and the plate (*a*) being moderately pressed against the mouth, so that they shall not slip, or suffer any gas to escape, the jar, together with the plates, is lifted out of the water, and set with the mouth turned up. In this position the jar is ready for yielding the gas to the jar into which it is to be transferred. This last jar is now to be filled with water, taking care not to leave any air in it, and its mouth is to be closed by the third plate. It is then to be turned with its mouth downwards, and, together with the third plate on which it stands, is to be placed on that part of the under plate which is not covered by the upper plate. The edges of the third and upper plate are placed as nearly as possible in contact; and across them the small jar, filled with water, is to be slid till it rests entirely on the upper plate. The hole in the upper plate is to be filled with a few drops of water, and the jar is to be slid so as to stand over it. The upper plate, and the jar standing upon it, are then to be so moved over the under plate, that the holes in each shall coincide. The water in the upper jar; as soon as the communication is thus opened, will descend into the lower or magazine jar, and be supplied with an equal bulk of gas from below at pleasure. When a sufficient quantity is transferred thus into the upper jar, it is pushed, together with its plate, in such a manner that the holes shall no longer coincide, and, consequently, the communication shall be cut off. The upper jar is slid back upon the third
plate,

plate, and, together with the plate, is removed in the same manner as it was applied. The mouth of the jar is turned upwards, the plate removed, and the gas submitted to examination: or, with mouth downwards, the small jar is placed on the shelf of the pneumatic trough, as the experiment may require. This detail appears tedious, but the practice is very easy. In this process there is, however, some danger of disturbing the lower plate, by lifting it from the mouth of the magazine jar, and so vitiating the gas by the introduction of common air. To prevent this inconvenience, it is necessary to secure the two perforated plates to the mouth of the jar, and to each other, allowing the upper plate, at the same time, to slide freely over the other. For this purpose, it is necessary to fix the plates, and the magazine jar, in a frame; which renders the use of them very convenient, and not liable to accidental disturbance.

The two plates (*a* and *b*), as in Fig. 1., are fixed in the upper part of the frame: (*a*) is fastened, (*b*) slides easily over it. The jar (*d*) is pressed up against the plate (*a*), by a moveable bottom (*k*), tightened by wedges or screws. The jar may be filled with water before it is fixed in the frame, and inverted in the trough; or the air may be generated in the jar, without the frame, and then, the frame being inverted, and the plates sunk in the water, the jar may be slipped into its place, and fixed there, which is the better way. The frame and jar are then set upright, and the gas may be transferred as before, without danger of loss or mixture.

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By means of this apparatus, jars of any size may be used as magazines, without the inconvenience of being obliged to invert them in large troughs.

This apparatus, also, on a smaller scale, may be used in operating with those gasses which can only be confined over mercury. The joints of the transferring plates retain very securely any quantity of mercury, provided the height of the jar is inconsiderable, not more than three or four inches, for reasons well known to experimental philosophers. And small jars, with ground mouths, hold mercury very well, when standing, without agitation, with their mouths downwards, on ground plates of glass. The careful operator will, however, gently press them to prevent accidents. This apparatus may be so far reduced in size, that, on a small scale, all operations, on gasses only to be confined over mercury, may be performed with about four or five pounds of mercury: which may, in many cases, be an object of attention to the philosophical chemist.

FIG. 1.

- (a) The under plate; the dotted line marks the circumference of the mouth of the magazine jar.
- (b) The upper plate.
- (c) The third plate; the dots mark the circumference of the mouth of the small jar. The small dark circle shews the place of the holes.

FIG.

FIG. 2.

- (*abc*) The section of the plates, (as in Fig. 1.)
 (*d*) The magazine jar.
 (*e*) The small jar.
 (*f*) The dotted jar shews how the small jar is placed, together with the third plate (*c*), before it is slid across the edges (*g*) of that and the upper plate.

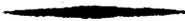


FIG. 3.

- (*abc*) The plates as before, but fixed in
 (*h*) The frame.
 (*d*) The lower or magazine jar, (as in Fig. 2.) wedged up against the under plate, by
 (*k*) The moveable bottom.
 (*e*) The small jar to be filled with gas from the lower jar.



FIG. 4.

A SMALL APPARATUS FOR OPERATING WITH MERCURY.

- (*abc*) The plates as before.
 (*d*) The small jar, four inches high, with a broad rim, by which the lower plate may be confined to its mouth, together with a frame in which the upper and third plates may slide. This frame may be made of hard wood, of ivory, or of iron.
 (*g*) A

- (g) A section of a wooden box, to hold as much mercury as will cover the plates and frame, and admit the bent tube of
- (k) A small retort or vial, with a bent tube, for generating the gas which passes through the hole of the plates.
- (m) A small spirit lamp.
- (n) A tube, fixed so in the box, that the mercury, descending from (d) as the gas is generated, shall overflow, and be received in a cup; with which small jars may be filled for transferring.

Fig. 1.

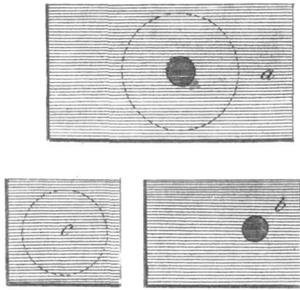


Fig. 2.

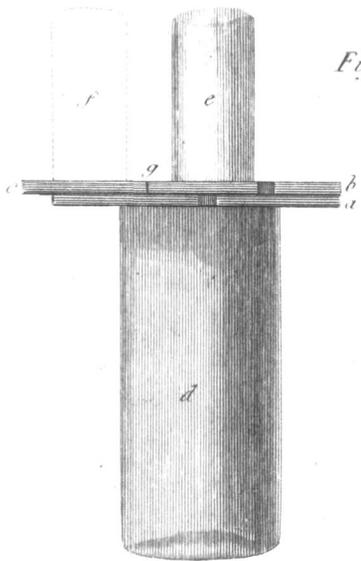


Fig. 3.

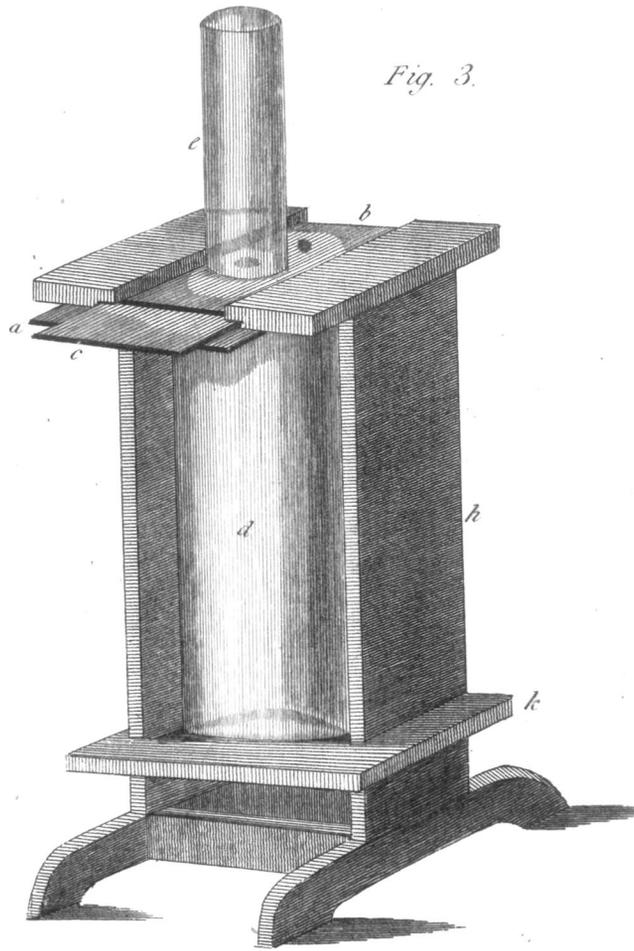


Fig. 4.

