BOILER CLEANER.

The object of this invention, patented by Mr. George A. Galloway, of Le Claire, Iowa, is to provide means for cleaning the fire surfaces of soot and other accumulations. The cleaner is constructed of two curved pipes connected to a T and bent to the shape of the boiler, their length being according to the extent of fire surface. The ends of the tubes are closed by plugs, and the upper side of the tube is formed with holes made so as to discharge steam at about an angle of 30 degrees. To the T is attached a tube of suitable length for use in handling the cleaner, and also for supplying steam, for which purpose the outer end of

GALLOWAY'S BOILER CLEANER.

the handle is connected by a flexible pipe with the boiler. In using the cleaner, it is inserted in the fire box and moved closely over the fire surface of the boiler, when the jets of steam act to remove the soot and scale. This action renders the surface cleaner, and results in a great saving in fuel by the removal of those non-conducting materials which always accumulate on the fire surface of a boiler.

A NEW AERIAL MACHINE.

We illustrate a new plan for aerial navigation designed by Dr. W. O. Ayres, of New Haven, Conn. In this apparatus the motive power is to be compressed air, which is intended to be condensed within the two drums, seen in the engraving; the air also fills the tubular framing of the machine. The air will be condensed under a pressure of say three thousand pounds to the square inch. The drums and tubes are expected to hold air enough to drive the engines and attached propellers for several hours. The author gives the following additional particulars:

"The plan and form which we suggest is not designed or expected to be by any means exclusive. The illustration shows it very clearly, and we believe that a machine constructed as here represented can do its work successfully. The propellers may be made to present a much greater extent of surface than the artist has drawn; the only thing for which we contend is that the principle shall be maintained.

"In order to afford support for our two systems of propellers, we must necessarily have vertical posts and horizontal bearings as well, that is, a table-like frame One of four feet by three, supported by four legs four feet in height, will give us the required space, and if made of steel quarter-inch tubing, will have all the strength needed. The rider sits in a seat like that of a bicycle, suspended by steel wires from the top frame, with which his shoulders are about level.

"The four horizontal propellers have their bearings on the vertical posts just below the top frame, thus bringing the lifting power as far above the center of gravity as possible. The vertically moving propeller revolves on a shaft behind the shoulders of the rider, midway between the side bars of the top frame. The air cylinders are two, for better division of weight, but are so connected that practically their air mass is one. A driving engine is attached to each cylinder, but the two work synchronously, and the regulating valve is controlled by the rider's left hand. They are so geared as to propel the upper horizontal fans, which have been already mentioned.

"The rider's feet rest on pedals like those of a bicycle, and by suitable connection actuate two horizontal fans as shown, so that the entire strength of his lower extremities can be brought to the assistance of the compressed air in the work of 'lifting.'

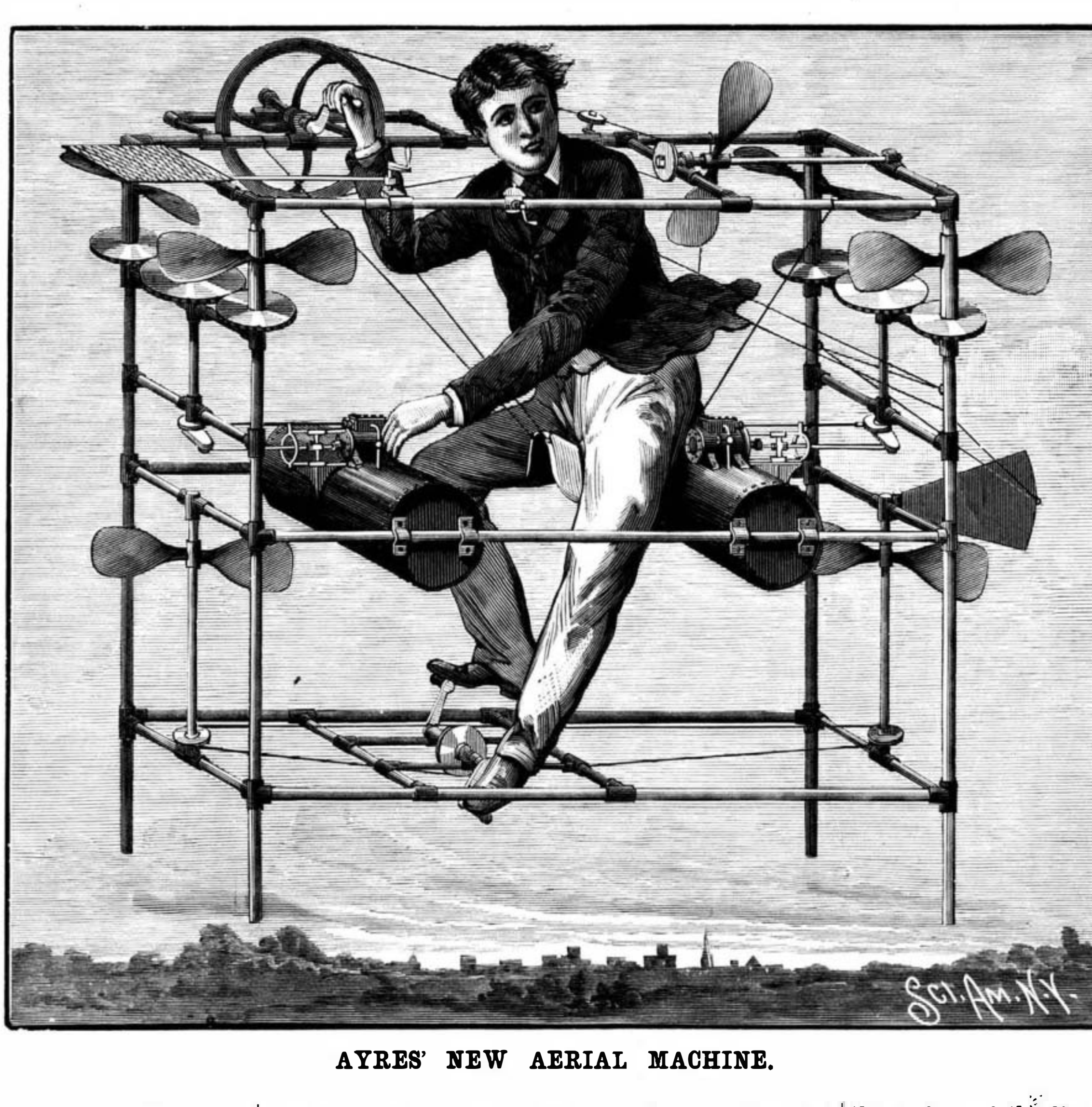
"The vertically revolving propeller is driven by the right arm of the rider, and the gearing, as shown, is very simple. An ordinary crank handle is conveniently placed for his grasp, and he drives the fan by direct motion.

"The rate at which these sets of propellers must be driven, so as to do effective work, can be determined only by actual experiment. We have no data from which to calculate with precision. The formulas that apply to boat propellers can give us but little aid, since the circumstances are so diverse. It is, however, probably safe to assume that the motion can be advantageously made much more rapid in air than in water.

"Thus far we have only two motions, vertical and horizontally direct; but our apparatus must be steered precisely like a boat, and it must ascend and descend obliquely. The former scarcely needs mention; the rudder, as shown, is controlled by cords whose 'wheel' is on the upper bar near the rider's left shoulder. But for ascent we need a new arrangement, though a very simple one. A flap or plate, twelve inches square, is hinged on the anterior cross bar, capable of motion in a vertical direction only. It must possess no little firmness and strength, and will need to be made of tubing like that of the main frame, covered with linen or silk. It is so controlled by strong cords or chains that it can be set at any required angle, and held there rigidly. Its 'wheel' is just in advance of that of the 'rudder,' as shown.

"This plate has no influence on the elevating power of the horizontal fans; but supposing them to be in motion, at just such a rate as to counterbalance the power of gravitation, then, with the vertical fan in action, the angle at which this horizontal rudder is set will determine the gradual elevation or descent of the machine.

"The apparatus, thus constructed, can all be brought within the weight of 65 pounds, and we have therefore to provide for lifting 225 pounds, assuming operator to weigh 160 pounds. This can certainly be done with the expenditure which we have specified, one-sixth of a nominal horse power, aided by the efforts of the rider."

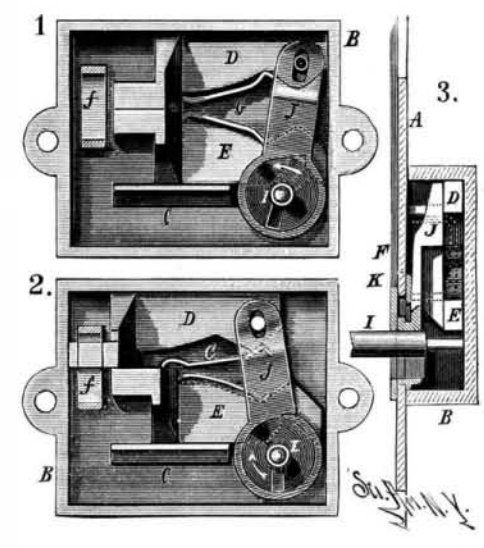


AYRES' NEW AERIAL MACHINE.

A HARPOON of the pattern made over forty years ago was taken from a whale caught near Coos Bay, Oregon, recently.

TRUNK LOCK.

The lock shown in the accompanying cut is especially designed for trunks, and is one that requires a special transverse manipulation of the key to unlock it. Between one of the side walls of the case and a lug, C, on the inside of its back plate are two bolts, D E, sliding independently of each other; the ends of the bolts enter the eye, *f*, of the hasp, which is hinged to the trunk lid in any approved way. The spring, G, having opposite arms, acts against the opposing edges of both bolts, so as to hold either in the projected or withdrawn positions. The lower bolt has a notch, shown by the dotted lines in Figs. 1 and 2, to receive the bit of the key, by which it may be thrown either way when the key is pushed in as far as it will go. The arm, J, is held to the inside of the faceplate by a split collar, K, upon which the arm is free to turn. The arm is connected to the inner end of the upper bolt by a pin entering a slot, so that the arm will throw the bolt either way when the bit of the key is held forward from the back plate so as to come within the hub of the arm. The keyhole in the hub coincides with the keyhole in the escutcheon when the arm is thrown out.



DUPONT'S TRUNK LOCK.

If an attempt were made to open the lock by any one unacquainted with its construction, the key, being naturally pushed in as far as it would go, would throw the lower bolt back, but the hasp would still be held by the upper bolt, to throw which it is necessary to draw the bit of the key outward clear of the lower bolt and into the hub of the arm, J. When this arm has been thrown back, its keyhole is out of line with the keyhole of the escutcheon; hence after unlocking the trunk the key can only be withdrawn by throwing the bolt outward.

This invention has been patented by Mr. L. E. Dupont, P. O. box 104, Farnham, Quebec, Canada.

Powerful Refrigerants.

Some experiments recently made by M. Olszewski appear to show that liquid oxygen is one of the best of refrigerants. He found that when liquefied oxygen was allowed to vaporize under the pressure of one atmosphere, a temperature as low as —181·4° C. was produced. The temperature fell still further when the pressure on the liquid oxygen was reduced to nine millimeters of mercury. Though the pressure was reduced still further to four millimeters of mercury, yet the oxygen remained liquid. Liquefied nitrogen, when allowed to evaporate under a pressure of sixty millimeters of mercury, gave a temperature of —214° C., only the surface of the liquid gas became opaque from incipient solidification. Under lower pressures the nitrogen solidified, and temperatures as low as —225° C. were recorded by the hydrogen thermometer. The lowest temperature obtained by allowing liquefied carbonic oxide to vaporize was —220·5° C.