APPARATUS FOR REMOVING GREASE, AIR, AND IMPURITIES FROM FEED WATER.

The first practical application of the apparatus shown in the engraving was on the steamship Walla Walla, on a voyage from New York to Portland, Or., and while it operated extremely well during that experiment, it has since been improved so as to make it almost automatic.

It removes the air usually forced into the boiler with the feed water, thus, it is claimed, removing the cause of pitting the internal surfaces of boilers and tubes by removing the free oxygen from the water. The removal of the air also prevents priming, and in condensing engines it effects a great saving by excluding the air from the boiler and cylinder, thus preserving the vacuum; and in addition to these advantages, it insures even feeding in a battery of boilers, and in all cases the apparatus indicates whether the pumps are in action by the continual working of the air relief.

This apparatus extracts all grease and foreign matter which would otherwise enter the boiler and be deposited as scale, or would form a surface scum which needs continual blowing.

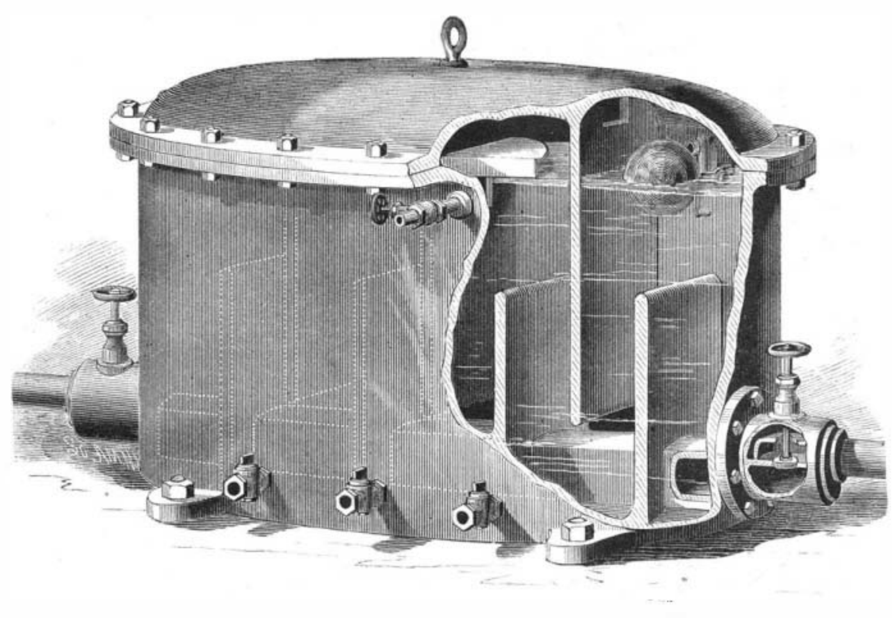
The complete manner in which the oil is extracted from the feed water is shown by the fact that steam taken direct from the main boilers where this device is applied, has been used for cooking without imparting the slightest flavor of oil, even when the engines were lubricated with crude petroleum. This is an important advantage in distilling water for drinking and culinary purposes.

This extractor is now in use on the following steamships: Walla Walla, Tallahassee, Chattahoochee, Nacoochee, Finance, and is being applied to other steamships in the course of construction.

The extractor, as shown in the engraving, consists of a vessel of suitable dimensions and strength, fitted with transverse partitions extending alternately from the top and bottom. The grease rises to the top of the water, and is removed through the oil discharge. The solid matter is precipitated, and may be removed from time to time. The air discharge valve is operated by a float as the upper part of the extractor becomes filled with air and the level of the water falls.

There are two varieties of these extractors made, one with a by-pass for allowing the water to pass around the partitions without going over and under them, the other without the by-pass. This apparatus is highly recommended by engineers who are familiar with its merits.

Further information may be obtained by addressing Messrs. Motley & Sterling, sole agents, 86 John Street, New York city.



WASS' GREASE, AIR, AND MUD EXTRACTOR.

Destruction of Ants.

A correspondent in the *Tropical Agriculturist* says: Take a white china plate and spread a thin covering of common lard over it; place it on the floor or shelf infested by the troublesome insects, and you will be pleased with the result. Stirring them up every morning is all that is required to set the trap again.

AERIAL NAVIGATION.

We give an engraving of a new flying machine, designed by Professor Baranowski, a small model of which has been repeatedly tried, we are told, with much success in St. Petersburg, Russia.

The apparatus is thus described by the *Revue Militaire*, of Paris. It consists of a great cylinder intended to have the form of a gigantic bird. The interior is provided with steam machinery, having a power proportioned to the size of the apparatus, with space for working the same; it has two lateral propellers, and one rear propeller; and their rotation determines the direction of the machine, whether it shall be vertical or horizontal; at one extremity of the cylinder is seen a species of oar which serves as a rudder; two great wings, composed of strong membranes, give an ascending motion to the apparatus, and keep it afloat in the air; the part which represents the beak of the bird is so arranged as to permit the entrance of air to the interior of the cylinder, to supply the crew and for the combustion of the fuel; the smoke, gases, and steam issue from the end, which, when the structure passes through space, will give the appearance of the tail of a brilliant comet. From the underside hangs a pendulum weight that keeps the apparatus in proper equilibrium.

In respect to the general problem of aerial navigation by flying machines, the *Engineer*, of London, makes the following observations:

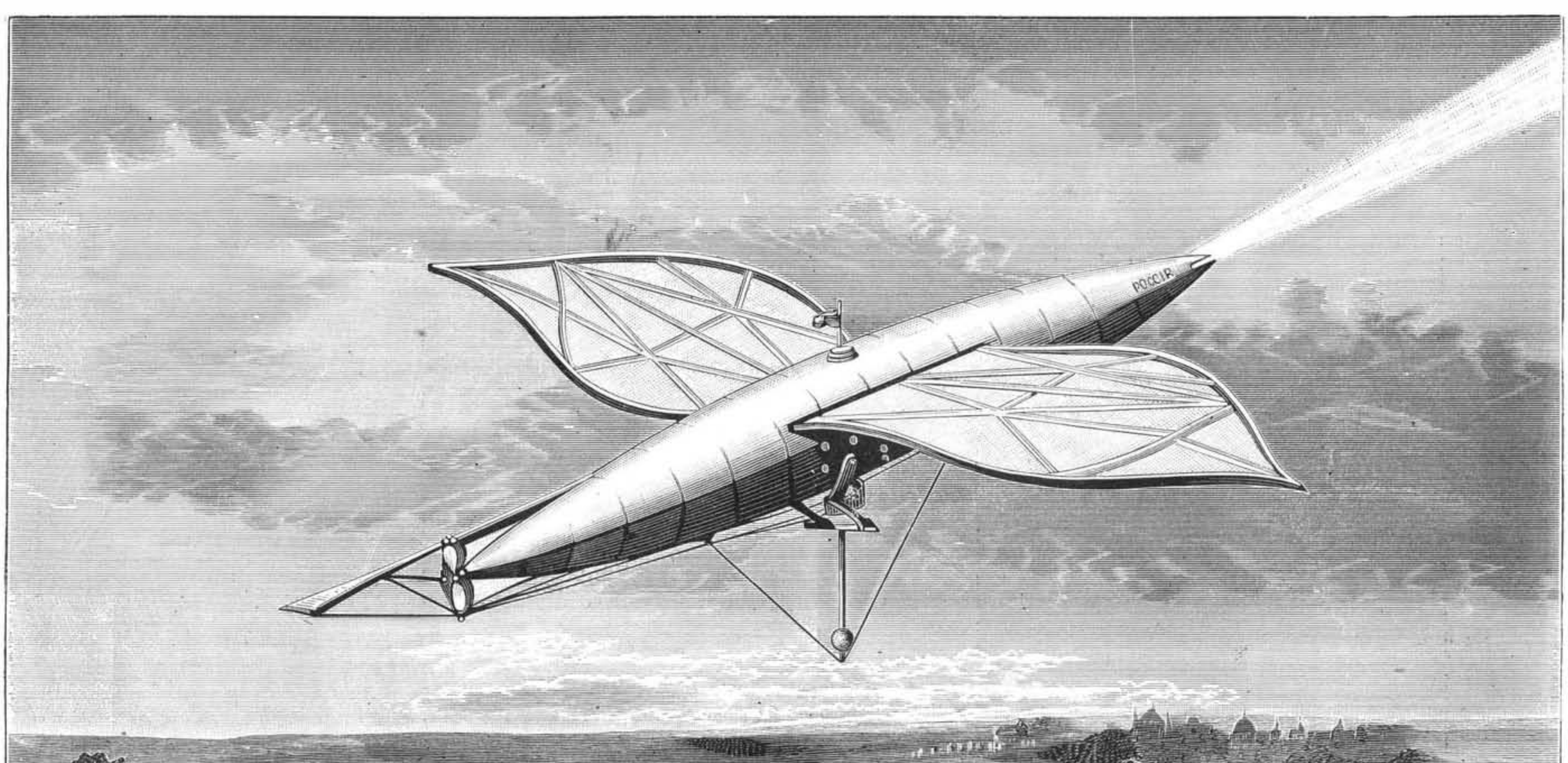
It may be urged that there is nothing mysterious about wing motion, and a simple up and down flapping will at least suffice to raise a bird in the air. Why should not men fly? The answer is that they are not strong enough. If we consider birds as machines, we see in the first place that they are all comparatively small. There is no bird of flight which weighs as much as even a very light man; but there are many birds which are far stronger than men. The albatross is, we believe, the largest—we do not mean the heaviest—bird of flight in existence. Its wings measure sometimes as much as 13 feet from tip to tip, but the total weight of the bird seldom, if ever, exceeds 28 pounds, or one-sixth that of a powerful man. But the albatross can keep its wings in motion for a whole day, while the strongest man would be exhausted if he had to keep beating the air with them for half an hour.

A great deal has been written from time to time about the effect of the wind on inclined planes in keeping birds afloat in the air. Those who have a competent knowledge of the laws of dynamics are, however, aware that the inclined plane action cannot alone keep a bird from falling to the ground. The action is at best just that of the wind on a kite; and the equivalent of the string must be provided or the bird will be carried away, just as the kite is when the string breaks. Birds, when sailing, are either going with the wind or are using up momentum acquired by previous rapid motion. The work done by the bird will vary continually; but it is strictly analogous to that of a swimmer, who, carrying a load, has to keep himself afloat by his own exertions. There is no way out of this. Nothing is got from the air in the way of help, save when upward currents strike the flying bird; and that such currents exist, every engineer who has seen the decking of a bridge lifted in a gale well knows.

Returning then to our albatross, the work it does is equivalent to continually lifting 28 pounds. The idea that the bird is buoyant in the air is a delusion. If it weighs dead 28 pounds, it will weigh living 28 pounds, and the variation in the displacement of the dead and living bird cannot represent more, at the most, than an ounce. In round numbers, 13 cubic feet of air weigh 1 pound. The albatross, therefore, represents no less than $13 \times 28 = 364$ cubic feet of air, while its entire displacement is probably at most 4 cubic feet. An increase in dimensions of one-fourth when alive as when compared with the same bird dead would represent about $\frac{1}{360}$ of its weight saved by extra buoyancy, which is nothing. The weight of the bird then may be regarded in exactly the same light as the weight on a brake driven by a portable engine. The brake wheel is always trying to lift it up. The power expended is measured by the distance passed over by any point in the rim of the brake wheel in one minute, multiplied by the weight and divided by 33,000 per horse power. Now, if we could tell the distance passed over by the bird's wings at each stroke, and the number of them, we should, knowing its weight, be able to estimate the power expended. We cannot do this in the case of the condor or albatross, but bearing in mind the small specific gravity of air, we shall not be very far wide of the mark if we say that an albatross probably possesses as much muscular energy as a man.

There is no engine in existence, certainly no steam engine and boiler combined, which, weight for weight, gives out anything like the mechanical power exhibited by, let us say, the albatross.

It is simply for lack of muscular power that man can never fly. There is no combination of wings or arrangements



PROFESSOR BARANOWSKI'S NEW STEAM FLYING MACHINE.