On the 5th of August this charge was with considerable difficulty, owing to the rough weather, placed at about 100ft. from the vessel's side on the bottom at a depth of 8 fathoms of water, its place being marked by a buoy—*vide* Fig. 2. The Oberon's circumstances were as follows:—The inlet and outlet valves of her condensers were left open. The Kingston valve of her feed-pipe was closed. The water-line was 2in. higher than the top of her condenser. The original weight of her hull before fitting her with special bottom was 590 tons—as now fitted it is 920 tons. Her cables and condensers may be taken as about 30 tons. Her starboard side has forty-four crusher gauges—*a a a*, Fig. 2—fitted to it. Each crusher piston is $\frac{1}{4}$ square inch in area, and behind it is a lead pellet hardened with antimony $\frac{1}{2}$in. long and 1-12in. in sectional area. Over each side of the vessel were suspended by 2in. ropes 12ft. long six 18-pounder shot, each fitted with a crusher gauge—*b b*, in Fig 2—having a piston of smaller weight than those of the Oberon crusher gauges, but in other respects similar.

The 500 lb. charge of gun-cotton in the mine was saturated with fresh water in a service water-tight iron case. Ignition was effected by means of two Abel detonating fuzes, and placed with two dry 9 oz. discs of cotton in a waterproof bag. We believe we are correct in saying that the circuit used in previous experiments was employed in this case also; that is, a circuit was provided for testing, being constantly open, passing from the test battery through the fuzes in the mine, and out through a copper earth-plate into the water. This circuit has a point of great resistance at the fuze, and cannot act strongly enough on the electro-magnet to being the powerful firing battery into action. This latter is brought into play, however, in a service mine, either by a circuit-closer being tilted, which opens a circuit momentarily where there is very little resistance, and which, therefore, has strength enough to magnetise the electro-magnet, or by the act of an operator on shore. It was the latter arrangement only that was applied on this occasion.

The firing took place from Fort Monkton, being directed by Captain Abney, R.E., who generally performed this duty, so as to be able to arrange to take an instantaneous photograph of the column of water thrown up. On this occasion, we believe, two were got at successive instants with great success.

Fig. 1 shows a view of the column of water thrown up by the explosion of the mine taken from a boat on the same side of the vessel, that is the starboard side, which was towards Fort Monkton. Except the fact that the charge is a formidable one, the test was not a very severe one. The general form of the column of water is itself an indication of the way in which a submarine charge acts. Water is easily displaced, but it is incompressible; hence any lateral explosion is rigidly resisted, and a column of water driven upwards with very great violence, as shown in Fig. 1. Thus it is easy to see that a vessel's safety is more affected by the horizontal than the vertical distance from the charge. It is also obvious that the water above a charge requires to be a certain depth in order to develope the full explosive power—this depth being, as we had said, about 8 fathoms for 50 lb. of cotton.

Fig. 2 shows the horizontal distance of the charge and the position of the vessel, as well as a string of half shells containing Noble's crusher gauges *c c c*, at 23ft. distance horizontally on the side of the charge remote from the Oberon, these being used in continuation of a course of investigation of pressures commenced by the Torpedo Committee in 1873. The general form of the iron plate bottom of the Oberon is also seen, as well as the condenser—*d* in Fig. 2—with which we have to do presently. At the moment of explosion the vessel would have to sustain a violent lateral pressure commencing in the direction of the arrow in Fig. 2, but as the gas became formed in large volume, in a nearly horizontal direction there would be comparatively little tendency to move her, but she would have to play the part of and transmit the shock falling on the water she displaced. Failing in any way to do this, she would suffer crushing or injury in some form. It has long been suggested that a weak spot in a vessel so placed was found in her valves and condenser, for any form of pipe containing water would be a means by which a blow would be rigidly transmitted to the extremity of such pipe. On this account the condenser and valves were provided, and formed a prominent feature in the arrangements. The result of the experiment showed how well grounded was such a supposition. The vessel scarcely seemed to vibrate under the shock of explosion, though the enormous column of water rose so close to her, the solid wood forming the cases and other solid matter being thrown into the air to a distance of about 150 feet, judging from the time at which they fell —6. 6 secs. after explosion. On boarding and examining the vessel she was found to be leaking slightly from some injury inflicted on the condenser. In no other respect had she suffered seriously. The bull's-eye on the deck had been dislodged upwards and the effects of a shock were manifest throughout; but little injury appeared to be done generally, and the live stock, consisting of sheep, fowls and rabbits, were flourishing.

Further examination being impossible in the present condition of the ship, she was ordered to be towed into dock where she will no doubt have to be detained for a considerable time in order to enable a thorough investigation to be made. The result, then, of this first experiment, on the face of it, must be held to be more satisfactory to the engineer officers than the naval officers concerned, for the explosion at the maximum distance proposed has found a weak place in the vessel; and although such slight leaking to the casual observer did not appear to be a very severe penalty to pay for approaching so near to a large mine, yet a moment's thought will show that the injury might be serious in the highest degree in a vessel really under steam. It is, in fact, impossible to say whether such a shock or a very similar one falling on a vessel, might not disable her engine.

We must not, however, go too fast; some plan may be devised of saving the condensers from the blow. Condensers themselves are an old subject of grief. We are not aware of the peculiar features of the one in question, but trouble has been caused by the desire to save money on condensers, and castings have often been made in one that should have been separate and very carefully performed. We are now speaking of merchant vessels; if this be a fault with them, how much more with the Royal Navy? It would, indeed, be sad if our condensers, like the heel of Achilles, rendered our supposed invulnerability in other respects of no avail.—*The Engineer.*

GLASS WOOL FOR FILTERING.

Our readers have no doubt heard of this new product of the glass industry Till now it has been possible only to draw out glass in threads of appreciable thickness; but now, by altering the composition of the glass mass, it has been found possible to spin it as fine as silk, and afterwards beat it together like felt. From this substance all sorts of ladies' knicknacks are made, such as lace, feathers, and even hats, and chemists also employ it for useful purposes. To put into paper filters, for instance, especially when caustic and corrosive liquids are under manipulation, it is of great value, for it prevents these substances coming into contact with the paper and destroying them.

To the photographer, in this connection, this glass wool would also be valuable; for how frequently is a glass bath ruined from the fact that the filter paper which he has employed is not altogether chemically pure! Again, no inconsiderable quantity of silver solution is lost from being absorbed by filter paper after repeated operations. A little glass wool pressed together, and stuffed into the upper part of a funnel, will suffice for the filtration of many silver baths; and when at last the wool becomes dirty from the accumulation of reduced silver and other impurities, then a little strong nitric acid is poured through it, and this at once dissolves and removes all solid matter. Washing out with distilled water will then render the filter as useful as ever.

For the filtrations of other liquids the glass wool is equally suitable, such as sulphuric acid, caustic potash, chromic acid; indeed, in these cases it is without a rival. Its cost is rather heavy, being as much as six shillings an ounce: but it must be remembered that it is as light as feathers, and consequently a quarter of an ounce will last a very long time.

A Substitute for Ground Glass.—To half an ounce of white, hard varnish add two ounces of methylated spirit. Shake well up, and allow it to settle for an hour or two. Clean *very carefully* the plate of glass, and coat with the varnish. When dry, a semi-opaque film of exquisite fineness will be left on the glass, which answers well.