A New Process for Quickly and Economically Converting any Mass of Cast Iron into Steel. By M. GALT-CAZALAT.

From the London Chemical News, No. 320.

The author passes superheated steam into the fused iron. In traversing the mass the steam is, of course, decomposed; the oxygen burns progressively the carbon and oxide of iron, while the hydrogen combines with and removes the sulphur, phosphorus, and other metal-loids which render the steel brittle. When the color of flame at the top of the mass indicates a proper amount of decarburation the steel is run out. The author operates either in a cupola or a reverberatory furnace of his own construction, in which the waste heat from the furnace is utilized to produce the steam. There has always been a difficulty in knowing when to stop the decarburating current, the process often being carried too far; but to-day, says the author, common steel can always be regularly produced by completely decarburating the cast iron and then adding 10 per cent. of spathic cast iron, which restores to the iron the amount of carbon necessary to effect the conversion into steel. By a peculiar contrivance the author shuts off the current of superheated steam from the metal and passes it into the chimney, where it serves to increase the draft in the furnace, and thus leaves the steel in a state of tranquil fusion for about fifteen minutes, by which he gets a perfectly homogeneous mass. To remove bubbles in his castings he has a very ingenious device. A cannon, for example, being cast, while the metal is still hot and soft, he covers the mould hermetically with a sort of hat, from the top of which rises a pipe, in which is placed 6 or 10 grammes of a mixture 80 parts of saltpetre and 20 parts of charcoal. By opening a stop-cock the powder is allowed to fall on the metal, where it gets ignited, producing a large quantity of gas which exerts pressure on all parts of the casting, removing the bubbles and increasing the tenacity of the metal.

New Differential Anemometer. By E. SWANN, F.C.S.

From the London Chemical News, No. 322.

I beg to forward, for insertion in the *Chemical News*, a description of an instrument for measuring slight variations of pressure, trusting that the information may be of interest to many of your readers, not only on account of its practical value, but also as an ingenious application of a philosophical principle.

The instrument in question is in use at the London and North Western Works at Crewe, and is the invention of Mr. Ramsbottom, the company's mechanical engineer.

At these works Siemens's system of gas furnaces is being introduced for the manufacture of iron and steel, and as it has been found advisable to register the pressure of the gas, which only varies a few hundredths of an inch of water, an instrument of more than ordinary delicacy was required.

It occurred to Mr. Ramsbottom that an instrument having the requisite sensitiveness might be constructed on the differential principle

by means of a syphon tube, containing two fluids of different densities. As shown by the accompanying diagram, the instrument consists of an oblong box, divided, by the diaphragm (A), into two cisterns, one

of which (B) is airtight and fitted with a tube through which the pressure is applied, and the other (C) merely closed by a lid. The two cisterns are about half filled with water, and are connected by means of a glass syphon tube, the legs of which are equal in length. The ends of the tube pass through glands, and reach nearly to the bottom of the cisterns.

The upper half of the tube is filled with a fluid, such as benzole, mobile, insoluble in and of less specific gravity than water, the lower halves of the two legs being filled with the water, which may be tinged pink with cochineal. To prevent evaporation, the surface of the water in the cisterns is covered with a film of oil. Should, however, the level of the two cisterns be disturbed from any cause, it can be restored by means of the stop-cock (E) connecting the two cisterns.

In the instrument as constructed the lighter fluid is benzole, in which camphor has been dissolved in sufficient quantity to obtain a specific gravity equal to eight-tenths that of water, or a difference of one-fifth.

The scale, with which the instrument is fitted, is divided in this latter proportion, so that each one-tenth of an inch pressure, in inches of water column, is represented by five-tenths of an inch on the scale. These divisions being again subdivided, a variation of one-hundredth of an inch of water column may be clearly read.

A screwed wire, suspended from the bend of the tube by a brass clip, carries the scale, which can be moved by the milled nut (F), to adjust the zero of the scale to the points of contact of the two fluids.

The action of the instrument is as follows: Any excess of pressure in the air-tight cistern (B) raises the level of the water in the leg (G) of the syphon tube, and causes a corresponding depression in the other leg (H), and the amount of variation between the two water-levels will be inversely proportional to the difference between the densities of the two fluids.

It will be seen that, assuming the difference of level in the two legs to be one inch, and, drawing lines across the figure at the two points, (see Fig. 2,) that the benzole in each leg above the higher level, being equal, is balanced, as is also the water below the lower level. There only remains, therefore, the inch of water on the one side against the inch of benzole on the other; consequently, the amount of pressure expressed in inches of water will be equal to the difference between the weight of the two columns, which difference in this case (one-fifth of an inch) is represented on the scale by a distance of one inch, thus giving a scale magnified five times.

I should be glad to hear of a suitable fluid of a density approaching nearer to that of water, as the less the difference between the two fluids, the larger the scale becomes.

It need hardly be pointed out that the instrument can also be used to indicate negative pressure, the action in the tube being merely reversed, and the reading taken from the opposite column, as in the case of a chimney draft.

Artificial Ivory.

From the London Journal of the Society of Arts, No. 680.

The *Mechanics' Magazine* says that the process by which the most successful imitation of natural ivory is obtained appears to consist in