corresponding to the position of the float at that instant. Another float in the cylinder C determines (by means of the system of pulleys E) the position of a pencil frame F working between vertical guides. This pencil (or pen) is kept in contact with a sheet of paper G G carried by drums and guide rollers H at the back of the instrument (and moved by clockwork) and makes a continuous line upon it. The paper is ruled with horizontal lines corresponding to the different speeds, and as it is coiled round the drums, prickers make upon it suitable marks at every quarter of an hour, the motion being so arranged that 5 in. on the paper corresponds to one hour. The sheet, therefore, when taken off the drums, forms in itself a complete record of the speed at which the engines have been running throughout an entire day, or week, or voyage, as the case may be. A counter of the ordinary construction is added to the instrument, which therefore shows the engineer at every instant the speed at which the engine is running at that instant, and the total number of revolutions run since the counter was set, and at the same time registers the speed in a simple continuous diagram.

The liquid used in the tubes is a mixture of glycerine and water, with some colouring matter to render its indications more distinct. This mixture has been found to evaporate very slowly at ordinary engine-room temperatures, but means are provided for supplying small losses from this cause should it be necessary to do so. We understand that the hydro-gyrometer is being applied both to locomotives and to steamers, as well as to stationary engines. In steamers, if the instrument is placed amidships, with the cylinder in a fore and aft plane, the accuracy of its indications will not we think be sensibly affected in ordinary weather. Care will have to be taken, however, as to placing it in the first instance in a proper position.

We have seen a modification of this instrument which is interesting enough to deserve mention, although in its present form it does not seem well adapted for self-registration, nor for giving indications which can easily be read with great accuracy. It consists simply of a glass cylinder half filled with liquid, with a graduated scale placed behind it, so that the graduations can be read off through the cylinder The zero of the scale corresponds to the level of the liquid, when the cylinder is stationary. The cylinder itself is in this instrument caused to revolve, and by its revolution a vortex is formed in the liquid, the depth of which is the greater the velocity of rotation. The speed is read off at any instant by simply looking at the scale through the cylinder, and noting the graduation which seems to be upon a level with the lower end of the vortex. This is certainly a very neat application of a simple physical fact to practical use.—*Engineering*

THE INVENTORS PARADISE.

"A thousand Patents," says Haseltine, Lake and Co's circular, "are granted every month in the United States for new inventions. This number exceeds the aggregate issue of all the European States, yet the supply does not equal the demand, and the average value of patents is greater in America than in Europe by reason of the vast number of new industrial enterprises and the higher price of manual labour.—A hundred thousand dollars is no unusual consideration for a 'patent-right' and some are valued by millions. The annual income from licences granted on the 'Blake Sole Sewing Machine' is over three hundred thousand dollars—and other patented inventions are equally profitable.—Inventors are encouraged by the moderate government fee of thirty-five dollars, which secures an invention for seventeen years without further payment—the rights of patentees are generally respected by the public, and no National Legislator, with a single exception, has ventured to proposed the abolition of a system which at once secures substantial justice to inventors, and proves of incalculable advantage to the nation"

In dry oxygen gas eggs are unaffected unless punctured. Moist oxygen decomposes the eggs. In moist nitrogen eggs will keep three months. Hydrogen the same. Eggs, whether pierced or whole, were perfectly preserved in carbonic acid, dry or moist. Illuminating gas the same. In chlorine water 1 to to 500 eggs kept eight months in a closed vessel. In a solution of dilute chloride of lime, eggs would not keep ten days. Lime-water and sulphite of lime kept them a little longer. Carbolic acid solution 1 to 500 preserved them about six weeks.

THE WESTINGHOUSE VACUUM BRAKE

We illustrate on page 121, an arrangement of vacuum brake constructed by the Westinghouse Continuous Brake Company, and applied by them in cases where the plan of working with a vacuum is preferred to that of using compressed air. As most of our readers are aware, the application of the brake blocks is in the case of the ordinary Westinghouse brake, effected by the admission of a supply of compressed air to a double line of pipes running through the train, these pipes being in communication with cylinders having pistons which are forced outwards by the action of the compressed air, and which, by this movement, apply the brakes. In the vacuum arrangement we now illustrate, but one line of pipes is carried through the train and the pistons of the cylinders connected with this line of pipes are forced inwards by the pressure of the external air, when a partial vacuum is formed in the pipes and cylinders. As the external atmospheric pressure thus made available is far less than that which can be applied in the opposite direction by the use of compressed air, the cylinders of the vacuum brake have of course to be larger than those used in the case of the ordinary Westinghouse brake, or else the stroke of the pistons has to be made longer and the leverage of the brake gear increased to obtain the necessary pressure on the blocks. In what is termed the Westinghouse "automatic" brake, worked by compressed air, the application of the brake blocks takes place instantly in the event of a train parting, while the brake can be applied from either end of the train, or, if desired, from any carriage. The automatic brake also provides at very slight extra expense for a very perfect system of intercommunication signals. These advantages are not possessed by the vacuum brake, but the latter is nevertheless preferred on some lines, and this being the case we think the Westinghouse Continuous Brake Company have acted wisely in not confining themselves to supplying brakes worked by compressed air only.

The details of the brake we illustrate have been worked out with much care and ingenuity. The exhaustion of the air from the pipes when the brake has to be applied is effected by a steam jet of the construction shown by Figs. ' and 2. Referring to Fig. 1, it will be seen that the apparatus consists of an outer casing having at its under side a branch which is connected by a pipe to the boiler, this outer casing being thus at all times charged with steam when the brake is in working order. Within the casing just mentioned is a tube or nozzle extending its whole length, this tube having at its upper side a valve seat fitted with a conical valve, which can be raised by a spindle which passes out through a stuffing-box, as shown. By raising this valve the steam is admitted from the outer casing or jacket to a space forming an annular jet, and also to a smaller central jet, as shown. The steam issuing from these jets produces an exhaustion, and draws the air from the line of pipes extending along the train, the line of pipes being coupled to the branch shown at the left-hand end of the apparatus in Fig. 1. At the right-hand end the apparatus joins an expanding or trumpet-shaped discharge tube. The constant steam jacketting of the jet tends to produce great promptness of action.

On the steam being shut off the communication between the external air and the line of pipes is also shut off by a light conical valve provided just behind the steam jet, as shown, this valve being forced on to its seat by the pressure of the external air. To take off the brekes the air has to be re-admitted to the pipes, and this is effected by raising another conical valve which is shown to the left in Fig. 1. On this valve being lifted the air enters the pipes from an annular space with which the valve communicates, this space being placed in communication with the external air by a series of holes, as shown in Fig. 2.

The arrangement for working the steam and air admission valves—or in other words for applying and releasing the brake—is very neat, the spindles of the valves being carried up as shown in Fig. 1 and 2, so that they can be acted upon by the opposite ends of a rocking lever which is worked by a side handle, as shown in Fig. 2. Thus by moving this handle in one direction the brake is applied, or by moving it in the other it is released, while by allowing the handle to remain in a middle position both valves are closed, and the brake remains either on or off according to which valve was opened last The whole brake action is thus controlled by a single handle and the arrangement is a very convenient one.

The line of pipes fixed on each carriage terminates at each