THE CAPERCAILZIE.

The capercailzie, or cock of the woods (*petrao urogallus*), is one of the largest and finest members of the grouse family. In size it is nearly as large as the turkey. The color of the male bird is a rich chestnut brown covered with a number of black lines irregularly disposed; the breast is black with a gloss of green, and the abdomen is simply black, as are also the lengthened feathers of the throat and tail. The female is distinguished by bars of red and black, which traverse the head and neck, and the reddish yellow barred with black of the under surface. The bird was once a common inhabitant of the highland districts of Great Britain, but in that locality it has become very rare, its habitat being restricted to the northern parts of the continent of Europe, Norway and Sweden.

The engraving of the capercailzie, given herewith, represents a male bird uttering the curious calls which it makes during the pairing season. Stationing itself on the branch of some lofty tree, at sunrise or just after sunset, it droops its wings, ruffles its feathers, and spreads its tail, like an angry turkey cock. The call is represented by the syllables "*peller peller*," and these are repeated at first at some little intervals; they gradually become more rapid until at last, after the lapse of a minute or two, the bird makes a sort of gulp in its throat, and finishes by a strong inhalation of the breath.

The nest of the capercailzie is made on the ground and usually contains from eight to ten eggs. When hatched, the young are fed upon insects, more especially ants and their pupæ. The adult birds feed mostly on vegetable substances, such as juniper, cranberries, and the leaves and buds of several trees.

THE CAPERCAILZIE.

Arsenic in Vulcanized Rubber Stoppers and Tubes.

It is well known that vulcanized rubber is unfit for several kinds of experiments, such as where it is required to determine the sulphur in gases and other substances, where the rubber may give up some of its sulphur to vitiate the results. Filhol has also found arsenic in rubber stoppers, which makes them unfit for use in testing for this poison. In Schneider's test the arsenic is converted into the volatile arsenious chloride by distilling the substances with a mixture of common salt and sulphuric acid. In making this test, in a flask closed with a perforated rubber stopper, through which the gas delivery tube passed, he found sulphur in the distillate. He suspected that the arsenic was derived from the rubber stopper, and therefore repeated the test without the use of any rubber, and found no arsenic. He also found that hydrochloric acid gas, when passed through vulcanized rubber tubes, also took up perceptible quantities of arsenic. The author does not state the color of the tube nor name of manufacturer, which is of some importance, as the arsenic was probably an accidental and not intentional constituent of that particular rubber, and was contained in the sulphur.

Burning Iron Castings Together.

The usual mode is by imbedding the castings in the sand, having a little space left vacant round about the joint where it is to be burned. Two gates must then be provided, one lying on a level with the lower side of this space and the other raised so that the metal; which must be very hot, is poured in at the higher one; it passes round, fills the space, and runs off at the lower gate. A constant supply of metal is thus kept up, till the parts of the casting are supposed to be on the eve of melting. The lower gate is then closed. and the supply stopped. When cool, and the superfluous metal chipped off, it forms as strong a joint as if it had been original.

Printing Pictures from Prints.

The page or picture is first soaked in a solution of potash and then in one of tartaric acid. This produces a perfect diffusion of crystals of bitartrate of potash through the texture of the imprinted part of the paper. As this salt resists oil, the ink roller may now be passed over the surface, without transferring any ink except to the printed part.

A LITTLE alum added to saffron in soft hot water makes a beautiful yellow ink.

Improved Air Pump.

In a new form of the Sprengel air pump, described in a paper at the British Association by C. H. Stearn and J. W. Swad, the mercury reservoirs at the top and bottom of the pump are closed, so that the external atmosphere exerts no pressure on the surface of the mercury contained within them. In consequence of this the fall-tube may be much shortened while the efficiency of the instrument is retained. At the commencement of the exhaustion of a receiver the mercury supply reservoir is filled to the top and closed by a stopper; a small exhausting syringe attached to the reservoir at the bottom of the fall-tube is then set in action, which removes a considerable portion of the air from the receiver to be exhausted, and also very much reduces the pressure on the mercury in the lower reservoir; the flow of mercury through the pump rapidly completes the exhaustion. A small vacuum tube with aluminium wires a quarter of an inch apart was exhausted in twelve minutes to such an extent that an induction coil, giving sparks half an inch long in air, failed to produce the faintest luminosity, the fall-tube of the pump being only nine or ten inches long.

Restoring Burnt Cast Steel.

The following recipe has been well recommended: Borax 1½ lbs., sal ammoniac ½ lb., prussiate of potash ½ lb., resin 1 oz. Pound these ingredients finely together, add a gill each of water and alcohol, and boil all to a stiff paste in an iron kettle. Do not boil too long or it will become hard when cool. The burnt steel is dipped while hot in the composition and slightly hammered.

Plaster Casts.

Not long the Prussian Ministry of Commerce and Manufactures offered prizes for the best and most simple methods of so treating ordinary plaster of Paris casts, by chemical or other means, as to render them capable of being washed, and at the same time to close the porous surface of the plaster, that dust might not penetrate its mass.

Plaster casts, even after having been thoroughly treated with stearin, are soluble in water to a very considerable degree. One need but tint the water with bluing or some similar color, and the gradual softening and solution of the plaster can be readily followed by the eye. A more striking illustration is had by stirring together a thick cream of plaster with gelatin previously treated with chromic acid, and letting them harden. When soaked a while in water the plaster wholly disappears. is dissolved away, and leaves a sponge-like substance of the insoluble gelatin. From these experiments it is seen that plaster casts, though saturated with stearin, should never be washed.

A method hitherto much used is to paint the plaster with oil color; but, apart from changing the appearance, the paint fills up the cavities, and, especially when the cast is a relief, blurs and destroys all its delicacy and exactness. On architectural plaster ornaments for interior decoration, capitals, cornices, etc., painting may be tolerated; but on all reproductions of sculpture, even a single coat of paint is inadmissible. Dr. Reissig, of Darmstadt, has, by two different processes, succeeded in transforming plaster of Paris into chemical combinations entirely insoluble, not only in water but in soft soapsuds. The first method, simplest and cheapest, is based on the fact that sulphate of lime (plaster of Paris) is changed by baryta water into sulphate of baryta, and a caustic lime gradually transformed by the action of the air into a carbonate of lime, as we know from the similar action in plaster and mortar. Baryta water is prepared by slacking together in a securely corked bottle, one part crystallized hydrate of baryta, with about twenty parts rain water, thus forming a saturated solution. After it has cleared, it is sponged or is poured over the plaster as long as this continues to absorb it. If after the cast has been dried by a moderate heat, the plaster continues to accept the wash, the sponging may be repeated; but this is seldom the case. This treatment, besides hardening the cast, gives it a whiter and clearer appearance.

The second method consists in changing the sulphate of lime, by the use of a weak alkaline silicate of potash, into lime, an exceedingly hard and durable substance. To obtain the potash silicate, water containing about ten per cent of caustic potash (pure and free from iron) should be heated to the boiling point, when so much silicic acid is added as will dissolve itself therein. In cooling, pipe clay and silicate of potash are generally precipitated in some degree. The liquid should be preserved in corked bottles until entirely clarified. Immediately before its use a small piece of pure potash should be thrown into it; or in its place, one or two per cent of potash may be added. The silicification itself is effected by dipping the plaster for a moment into the bath thus prepared; or, if the cast is immovable, by applying it with a sponge or an atomizer. When the surfaces to be covered are large, the liquid may be diluted with rain water. After the almost instantaneous chemical change has taken place, the superfluous solution should be carefully removed by washing with soapsuds. Some little experience is necessary to decide the exact time of exposure to the solution of this second method; but by practice it may soon be judged by the smoother and firmer appearance of the plaster, and by its hardness as felt by the finger nail. The fresher the plaster, and the more porous the cast, the more quickly should the bath be employed. Casts made of old plaster cannot be silicified to advantage. After having been treated by either of these processes, plaster of Paris casts will not be in the least dissolved by washing with water or soapsuds: but, though their surfaces are no longer sulphate of lime, yet they still retain their original porous nature, and readily absorb dust and the dirty water of the first washing. To obviate this, they are finally coated with an alcoholic solution of common soap, which, after the evaporation of the alcohol, entirely stops up the pores, and much facilitates the washing. It may be prepared by dissolving one part of bar or Castile soap in ten or twelve parts of alcohol; or it may be had of apothecaries under the name *spiritus saponatus*. This latter, however, is generally prepared with alcohol of a low grade. A little more expensive, but much better filling, is to be had by dissolving steatite of sodium in pure spirits of wine; this gives a really beautiful transparent tone to the plaster, and is highly to be recommended. The application of both is the same, it being necessary, if possible, to warm the cast, that the solution may be well absorbed; a repetition of the process is desirable. With the evaporation of the alcohol the operation is completed; the cast is in effect vitrified without coating its surface.