tally along with great swiftness, so as to strike the surface skimmingly and travel along with the motion compared familiarly to the flight of ducks and drakes. I believe that when a bird has given to its body, by a few powerful propulsive efforts, a rapid forward motion, the resistance of the air resulting from the combination of perfect balance and swift forward motion suffices to explain all the phenomena of this floating movement. And I believe that if ever the art of flying—or rather of making flying machines—is attained by man, it will be by combining rapid motion with the power of perfect balancing.

## GENERAL NOTES.

INSTRUMENTAL SUBSTITUTE FOR SINGING IN BIRDS.—The peculiar sound which the Lesser Spotted Woodpecker (*Picus minor*) makes upon trees by the action of its bill is extremely curious. It is quite certain that this habit has nothing whatever to do with the quest for food. The bird selects one particular spot upon the trunk or bough of a tree, which spot is naturally sonorous from the wood being more or less hollowed by decay. The bird returns to this precise spot continually during the day, and produces the sound by striking the wood on the spot with its bill, the stroke being repeated with a rapidity which is really incomprehensible ; for it quite eludes the eye. It is effected by a vibratory motion of the head ; but the vibrations are so quick that the action looks like a single stroke. After short pauses this stroke is again and again renewed, sometimes for several minutes together. During each interval the woodpecker looks around and below with evident delight, and with an apparent challenge of admiration. The beautiful crimson crest is more or less erected.

The whole performance evidently takes the place of the vernal song in other birds, and it is probably the only case among the feathered tribes in which vocal is replaced by instrumental music.

The nest is not usually in the same tree, but similar spots are selected on several trees in the neighborhood, and as the sound is very loud and heard a long way off, the hen bird, when sitting, is serenaded from different directions.

The above observations on the substitution of instrumental methods for singing among woodpeckers are highly interesting, and were made by the Duke of Argyle, and recorded in *Nature*.

RUSTY GOLD is the term applied to placer gold which escapes amalgamation in hydraulic and sluice washings. This is an old difficulty with miners, but the matter has never been thoroughly understood or properly investigated. Recently Mr. H. G. Hanks has read a paper on the subject before the San Francisco Microscopical Society. Under the microscope the particles of the sample he examined had a dark brown color, showing in some cases nearly white silica in irregular imbedded fragments, forming a compound cement. Some particles were wholly, others partly, coated. Placed in mercury the pieces wholly coated were acted on, those only partially so became amalgamated to the extent to which the gold was unprotected. The coating was found to be brittle. When pieces were struck with a hammer the coating scaled off, after which amalgamation took place without difficulty. On boiling some of the rusty gold in hydrochloric acid the coating was decomposed, silica separating, the acid acquiring a golden yellow color, and giving a strong reaction for iron, the gold being left clean and bright. Mr. Hanks appears to have refrained from drawing any conclusions, and further investigation appears desirable.

YEAST.—A writer suggests that by a little study the large amount of "pressed yeast," which is now a by-product in most breweries, might be made into a profitable manufacture, similar to the German barm or yeast, which always commands a ready sale at a high price. He says that in the preparation of pressed yeast for brewing purposes we must first of all get rid of the saccharine matter if we want it to keep, as that would cause it to ferment and spoil, and also the bitter flavor, which can be accomplished by washing in a large volume of cold water. But while the washing process answers well in one sense, it unfortunately dissolves out the mineral matter of the yeast, which is necessary for its reproduction. The necessary conditions requisite for vigorous growth are a certain amount of sugar, soluble albuminoids (or an ammoniacal salts), oxygen of the air, and mineral matter, phosphoric acid being absolutely necessary.

POLYCHROME PRINTING.—This is an invention to obviate many of the drawbacks to chromo-lithography which entails a large number of separate printings, the drying after each impression, the "registration," and the many expensive stones which have to be kept idle. The new process of Mr. White, of Paris, is a method by which all the colors of a chromo-lithograph may be produced at one impression.

The pigment for the ground color is placed in a frame, in a solid block, and the design traced upon it. All the parts which do not form the ground color, are then cut out, and the spaces thus left are then filled by pouring in hot liquid pigments corresponding to the colors or shades required to be produced. When cold the recently added color is trimmed off with a knife, and another poured in, until the whole is built up. When complete the mosaic is placed in a press and the surface shaved by a knife, so as to make it true and level, and when moistened with suitable chemicals, it is ready for use. The impressions are clear, permanent and pass through the fabric.

Re-productions by this process of the farfamed Gobelins and Aubusson tapestries, are said to have deceived dealers and connoisseurs.

AMERICAN OLIVE OIL.—We notice in the *Mining and Scientific Press*, a formula for making Olive oil on a small scale, as produced in California. Compare this with a description in the *Pharmaceutische Handelsblatt* of the manufacture of Olive oil in Southern France.

In California they grind the olives before pressure. This appears to be an error, they should be crushed between two stones, turning against each other vertically. We can quite understand that crushing leads to quite different results to grinding. In cider producing countries in England apples are prepared for cider, in the same manner that the French prepare their olives for oil, by grinding them under revolving stones. Cider thus prepared will keep for years and improves with age, some say on account of an essential oil expressed from the apple pips. In America, cider is made from crushed or chopped apples, and possesses neither the flavor nor the keeping properties of that produced in Devonshire or Herefordshire, England.

There is another point which may be important on the "Rhone." The oil when filtered is stored in stone vessels ; on the Pacific they use tin cans.

TEMPERATURE OF FLAMES.—Signor F. Rosetti has made the temperature of flames the subject of a series of investigations. For this purpose he has made use of the calorimeter of his own invention. The maximum temperature of a Bunsen flame he has found to be 1360° C. (2480° F.) obtained by the combustion of one volume of gas and two and one-fifth volumes of air. The admission of either a greater or less quantity of air reduces the temperature. Changes in pressure have but a slight influence on temperature. The flame given by gas, diluted with its own volume of nitrogen, shows a temperature of 1180° C. (2156° F.), and diluted with three volumes of nitrogen, 1040° C. (1904° F.). The same degrees of dilution with carbonic acid show, respectively, 1100° C. (2012 F.) and 780° C. (1436° F.). Among other temperatures noted were the following : From Locatelli lamp, 920° C. (1680° F.); stearin candle, 940° C. (1724° F.); petroleum lamp with chimney, 1030° C. (1886° F.); the same without chimney, illuminating part, 920° C. (1688° F.); sooty envelope, 780° C. (1436° F.) ; alcohol lamp (alcohol, .912), 1170° C. (2138° F.) ; ditto, (alcohol, .822), 1180° C. (2156° F.). The difference in the heating power of alcohol resulting from widely differing percentages of water is considerable.

THE suggestion made by the *Journal of the Telegraph* to designate a message sent by telephone as a *Phonogram* appears to meet with favor in the English electrical journals.