Arrowroot Manufacture in Queensland.

The machinery used for the manufacture of arrowroot is simple in the extreme, and is chiefly manufactured on the place, the shafts, pulleys, and engine work being, of course, foundry-made. The first process shown was the roots being tipped, by two boys, into a long trough, through the length of which a shaft slowly revolved, and by means of wooden projecting pegs the dirty roots were stirred up, and so cleaned, there being a constant stream of water running through the trough. These revolving pegs have a screw pitch, so that the roots are gradually moved toward the far end of the trough, where they are caught up by a sort of bucket pump, which elevates them some 12 feet, and drops them regularly into a hopper. As they fall to the bottom of this, they meet the grater, which is a drum of perforated galvanized iron, driven at great velocity. A small stream of water pours into this all the time, and the roots are quickly grated up into a brown colored pulp. This mass of fiber and pulp falls into a cylinder of perforated iron, about 9 feet long and 2 feet in diameter; through the length of this runs an axle, on which are two beaters, like the drum of a thrashing machine; these smash up the fibrous pulp, exposing it to the action of the water, so as to enable all the starch and fine pulp to be washed out and squeezed through the perforations of the cylinder, while from the one end is discharged a constant stream of the dirty looking fibrous refuse. The finer pulp, as squeezed through the perforations of this cylinder, is received in a precisely similar one below; here, again, the mass, now only pulp, is beaten up; but the perforations around this second drum being very small, only the starch and dirty looking water passes through, the pulp being again discharged from the cloaca at the end. The stream of water and starch pouring from these cylinders is received in troughing, extending for 100 feet around the shed, and, as it runs along, the starch, being heavier than the water, all sinks to the bottom, and the water runs away. So far the work goes on automatically, no one but the two boys throwing in the roots troubling themselves about it. But toward the end of the day the stream of water is stopped, and the arrowroot starch scraped up out of the trough, where it has accumulated in a layer some inches in thickness, and is placed in large vats and tubs, all ranged in regular rows. Before being put into these tubs, it is passed through fine muslin sieves, and at the same time another stream of water is turned on. These fine sieves effectually clear it of any foreign matter, and it settles by the morning at the bottom of the vats, clean and white as snow. The water is drained from it, and the starch put into a centrifugal machine similar to what is used for sugar; this soon forces out the surplus water, but perfect dryness is essential to its keeping qualities, so it is now carried to the drying room, which is some 60 feet long by 12 feet wide. Round the whole length of this runs a flue, heated by a special furnace, and over this are shelves of galvanized wire-netting; on this netting is placed calico, and on this is spread out the starch. In this hot-house the moisture is quickly evaporated, and the arrowroot becomes crisp and grain-like. On fine days it is spread out in the sun on similar wire stages. All operations are now finished, and the flour is stowed away in bins in the storehouse, and there made up into the packets usually seen in the shops.—*Queenslander.*

Soda in Commercial Potash.

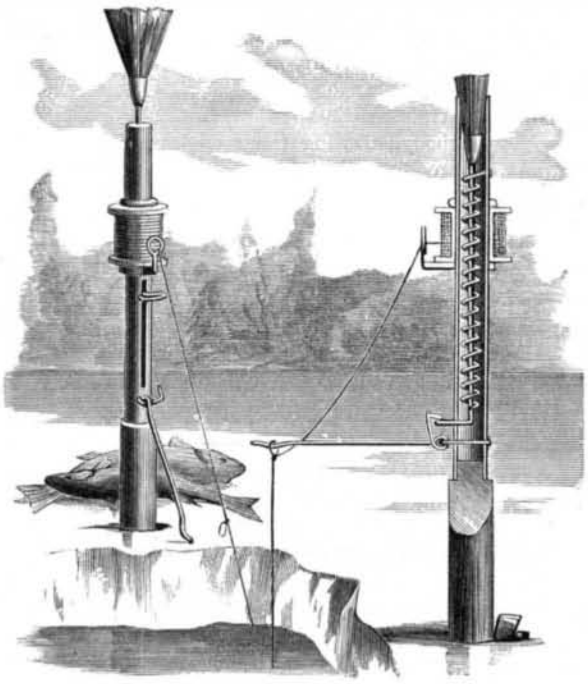
A Belgian chemist gives the following method for detecting the presence of soda in samples of carbonate of potash. It is based on the fact that chloride of sodium is much less soluble than chloride of potassium in strong hydrochloric acid. A solution of the potash to be tested is prepared, the potash being dissolved in ten times its weight of water. One ounce of this solution is saturated with diluted hydrochloric acid, and then evaporated until it is dry. The residue, which is a fine powder, is introduced in a bottle of 10 oz., hydrochloric acid of 1·189 specific gravity, which has been previously saturated with chloride of sodium, being then added. The mixture is well shaken, then left to settle, and after five or six hours, all the chloride of sodium will have settled to the bottom while the chloride of potassium will be in solution. The whole is now filtered through asbestos, and the deposit is washed with hydrochloric acid saturated with chloride of sodium. It is then dried at 150° C., weighed, and will consist entirely of chloride of sodium, an accurate result being obtained if the operation has been carefully executed.—*Weekly Drug News.*

A PLANER has been constructed at Pittsburg capable of planing a piece of iron or other metal ten feet wide, ten feet high, twenty-four feet long, and so arranged that four cutting tools may operate on the work at one time, two being on the crosshead and one on each upright.

WHITCOMB'S FISHING APPARATUS.

This apparatus is designed to be set after the fashion of a trap for fishing through holes made in the ice in winter, so that when a fish bites at the hook a signal will be automatically displayed.

A round tube, forming the body of the apparatus, is mounted on a stick, which serves as a standard. On the outside of the tube there is a spool, to hold the fish line. The lower end of this spool bears on a stop, and the spool is kept in place on the upper side by an elastic clasp, which can be moved up and down on the tube, and set to bear against the end of the spool with sufficient friction to prevent the spool from turning easily. Inside the tube is a rod the upper end of which is furnished with pompon, flag, or other suitable device as a signal, which comes down into the tube when the device is set, as seen in the sectional view, but which shoots up into sight when the device is sprung, as seen in the perspective view. This rod is impelled upward by a spring, one end of which is attached to the tube, the other end being attached to the rod. The rod is bent out laterally at the lower end, projecting through a vertical slot, made in the wall of the tube, forming a tappet for receiving a tripping lever, which is pivoted to the outside of the tube, with its outer end, when the device is set, projecting laterally for connection with the fish line. A loop is tied at a convenient point in the line, and hung upon the outer end of the tripping lever, and drops down into the water, with a hook suitably baited hanging from it.



NOVEL FISHING APPARATUS.

When a fish takes hold of the hook, the hook of the tripping lever is detached from the lateral projection of the rod, which, being thus freed, flies up and displays the pompon at the top. This is the invention of Mr. M. H. Whitcomb, of Holyoke, Mass.

THE FASTEST ATLANTIC STEAMER AFLOAT.—The steamer Alaska left New York on the 19th of October last, and arrived in Queenstown in the surprisingly short time of 6 days 21 hours and 46 minutes. Her log showed as follows: 10, 380, 389, 381, 388, 401, 403, and 436 knots, or a total of 2,788 knots.

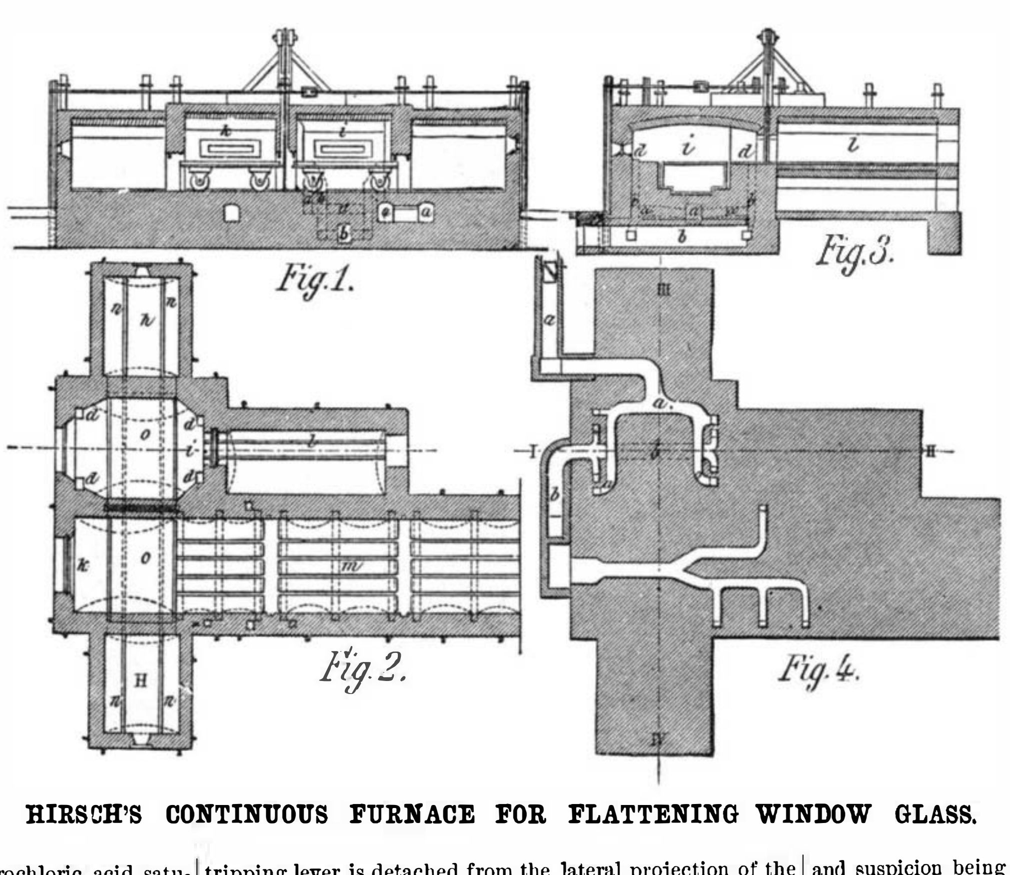
Birds.

Professor Ewart last week gave an account of the structure of birds. After explaining the main features of difference between the flying and the running birds at present existing, he went on to say that the running birds of the Tertiary period had a much wider distribution than the same class had now. Among the flying forms there were a number which could not fly; and the flightlessness was always accompanied with modifications of the limbs and the sternum, and those modifications so mimicked the form of those structures in the running birds that some zoologists believed that all the running birds were only modified flying birds. In the Eocene beds was found the remarkable odontopteryx, which had peculiar bony projections, not true teeth, along both jaws. The chalk beds showed a great abundance of flying reptiles, and while those beds were being deposited there were a large number of aquatic birds, some of which were highly specialized, closely resembling our flying birds, while others more resembled our running birds. The ichthyornis of the chalk period had true teeth, and the vertebræ were like those of fish. The hesperornis, a running bird, had merely rudimentary wings, while the posterior limbs were enormously developed. It had well-developed teeth, which, however, instead of growing from sockets, were set in a narrow continuous groove, as in some of the extinct saurians. The brain was like that of a lizard, and the vertebræ like those of ordinary birds. The rocks of the Jurassic period presented enormous flying reptiles, along with remains of birds allied to ostriches, but which had teeth and fish-like vertebræ. The archæopteryx seemed to have had a more or less complete covering of feathers, and it had true teeth and fish-like vertebræ. It was an exceedingly generalized form, closely resembling some of the American Jurassic dinosaurs. Apparently some of the smaller dinosaurs were arboreal in habit, and probably differed from archæopteryx in that they had no feathers. It might be inferred that archæopteryx was descended from a still more primitive creature, which, besides being the ancestor of archæopteryx and the birds, was also the ancestor of the dinosaurian reptiles.

HIRSCH'S CONTINUOUS FURNACE FOR FLATTENING WINDOW GLASS.

In Hirsch's furnace for flattening window glass, shown in Figs 1, 2, 3, and 4, the operation is rendered continuous by the addition of the two chambers, *h* and H, at the sides of the flattening furnace, *i*, and annealing furnace, *k*, and by employing the channel, *n*, and the stones, *o* and O. The flattening of the cylinders coming from the heating channel, *l*, takes place on the stone, *o*, while the flattened sheets are raised from the stone, O, of the annealing furnace, *k*, and conducted into the annealing channel, *m*. The stone, O, is then pushed into the chamber, H, while the stone, *o*, passes into the annealing furnace, *k*, to deliver its sheet into the channel, *m*. The two stones are afterward pushed back, *o* to *h*, and O to *i*; and then the operation begins again. The work can likewise be regulated in such a way that the stone, *o*, shall pass into the chamber, *h*, after flattening, while the stone O, shall serve for flattening in furnace *i*, to pass from thence into chamber, H; the stone, *o*, being afterward pushed from *h* to *k*, where its sheet is discharged into the channel, *m*, and this stone being then brought into the furnace, *i*, while O passes from H to *k*.

The gas and air conduits, *a* and *b*, debouch in the four angles, *d*, of the flattening furnace, *i*, so that the air and gas combine and burn in those places. After the cylinders have been brought into the flattening furnace the ingress of air through the conduits, *b*, is shut off, so that the complete oxidation of the flame ceases; but as soon as the sheet of glass has passed into the annealing furnace, the air is allowed to enter again, so that the desired temperature may be obtained.



HIRSCH'S CONTINUOUS FURNACE FOR FLATTENING WINDOW GLASS.

Poisoning from Red Stockings.

Dr. J. Woodland writes to the *Lancet* that, having had his attention directed to several cases of great irritation of the feet and legs, causing small pustules to arise and the skin to subsequently exfoliate, and suspicion being fastened upon red stockings which the patients wore, he carefully analyzed them. He found a tin salt which is used as a mordant in fixing the dye. He succeeded in obtaining as much as 22·3 grains of this metal in the form of the dioxide, and as each time the articles are washed the tin salt is rendered more easily soluble, the acid excretions from the feet attack the tin oxide, thus forming an irritating fluid.

IN the ten years from 1870 to 1880 the value of the silk production of the United States rose from $12,210,662 to $34,410,463.