

inal properties with farm animals; that the oil of the sunflower seed is not produced commercially in the United States; and that in the cultivation of the sunflower the methods pursued for growing Indian corn are to be followed, and the plant is capable of cultivation over almost as wide an area as Indian corn.

#### A PAIL FOR LIVE BAIT.

Every fisherman knows how difficult it is to keep minnows alive. If the fish are kept in a pail, the water must be constantly changed to furnish a new supply of oxygen. The difficulty thus presented of



A NOVEL LIVE-BAIT PAIL.

feeding sufficient oxygen to enable the fish to live not only for hours, but for days, has been very ingeniously overcome in an invention for which Mr. Cassius M. Fisk, of Napoleon, Ohio, has taken out a patent.

Mr. Fisk's invention is a pail which is provided with an air-chamber in its bottom and with a hand-pump secured to the side. The lower end of the pump-cylinder communicates with the air-chamber by means of a pipe; and the air-chamber communicates with the body of the pail by means of a flexible pipe. The pail having been filled with water and the minnows placed therein, the hand-pump is operated to fill the air-chamber with compressed air. Such is the pressure that the air is spontaneously supplied to the fish in the water through the flexible pipe. It is necessary to pump fresh air into the chamber only at very long intervals; for the construction of the flexible pipe is such that the air is very gradually discharged.

The inventor assures us that he has subjected his device to most severe tests. Forty fish, among them minnows so delicate that they cannot ordinarily be kept alive for more than ten hours, were placed in the pail and supplied with air in the manner described. So efficient was the apparatus that after twelve days the fish were all alive, although the water had not been changed during the interval and had become very foul. When the supply of air was at that time cut off, the fish came gasping for oxygen to the surface. The same minnows could not be kept alive in the same amount of fresh water for more than fourteen or fifteen hours.

#### New Compounds of Cobalt.

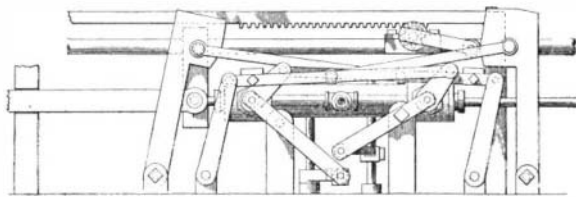
M. Ducru has recently presented to the Académie des Sciences the results of a series of experiments in which he has formed several new compounds of cobalt. If to a solution of cobalt containing ammoniacal salts and a sufficient proportion of free ammonia is added arsenic acid or a soluble arseniate, a gelatinous precipitate, very voluminous, is seen to form, its color being more or less violet. At the ordinary temperature these precipitates are not modified, but if the flask containing the liquid and precipitate is kept near the boiling point in a water-bath, the precipitate is slowly modified; it contracts and is transformed into another of a rather dark red which microscopic examination shows to be entirely crystallized. The duration of the experiment is variable; with concentrated solutions in the proper proportion it may take but a few minutes, but with weak solutions as long as 100 to 150 hours are required. The crystalline compounds thus obtained are cobaltous salts; under the microscope they are seen as needles grouped in clusters, and sometimes in rhomboidal plates. They have a marked action upon polarized light, and belong to the clinorhombic system. They are insoluble in water and weak ammoniacal solutions, but easily soluble in the mineral acids. At the ordinary temperature they lose ammonia, but very slowly. These compounds, which M. Ducru has thus obtained for the first time, are ammoniacal arseniates of cobalt, but their composition varies. While the proportion of cobalt and arsenic is practically the same for all these products, that of the ammonium may

vary from zero to 8.6 per cent. It is not the proportion of ammoniacal salts in the solution, but the amount of free ammonia which determines the proportion. The superior limit is reached when the liquor contains 350 per 1,000 of ammonia (20 per cent strength) or 69 parts by which of  $\text{NH}_3$ . The salt obtained under these conditions is a tri-ammoniac arseniate of cobalt, having the formula  $(\text{AsO}_3)_2 \text{Co}_3 + 3 \text{NH}_3 + 5 \text{H}_2 \text{O}$ , which approaches the zinc salts obtained by M. Bette. On the other hand, the action of this salt upon the salts of cobalt in presence of ammonium salts (without free ammonia) gives a pale rose salt, crystallized in fine needles, in cotton-like clusters. This salt contains no ammonium, and its composition  $(\text{AsO}_3)_2 \text{Co}_3 + 8 \text{H}_2 \text{O}$ , is that of natural erythrine; the crystalline form and grouping are the same. M. Ducru has isolated two of these salts which lie between erythrine and the first mentioned compound; the mono-ammoniac salt  $(\text{AsO}_3)_2 \text{Co}_3 + \text{NH}_3 + 7 \text{H}_2 \text{O}$  is formed when the solution contains 15 per 1,000 of free ammonia, while the di-ammoniac salt  $(\text{AsO}_3)_2 \text{Co}_3 + 2 \text{NH}_3 + 6 \text{H}_2 \text{O}$  is obtained at a concentration of 60 per 1,000. The four salts thus obtained appear to be distinct compounds and not mixtures. The experimenter intends to describe a similar series of nickel salts and also a new method of analysis for arsenic which is based upon these experiments.

#### A VALVE MOTION FOR SMALL HIGH-PRESSURE PUMPS.

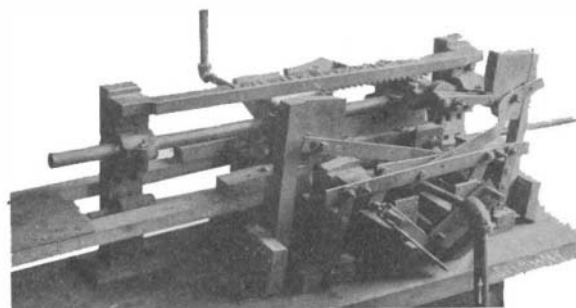
The use of high pressures with pumps of small dimensions presents difficulties, as the valves are liable to be kept open by the pressure. To overcome this drawback, Adolph Richter, 1138 First Avenue, Manhattan, New York city, employs a special device for pressing the valves firmly against their seats during the time they should remain stationary, the valves being released shortly before they are to be shifted.

The valves are turned by means of the levers shown at the end of the elevation, each lever being connected with one suction valve and one delivery valve by links and crank arms. These levers are struck periodically by an arm on the front end of a shaft which is journaled in a slide moving together with the pump piston and provided with a pinion rolling on a stationary rack. This same shaft carries at its rear end another



SIDE ELEVATION OF THE VALVE-GEAR.

arm which at the end of each stroke operates a set of toggle levers connected with spring arms exerting an axial pressure on the valves when the toggle levers are in line with each other. The parts are so timed in operation that the axial pressure on the valves is relieved before they are turned, and after they have



PERSPECTIVE VIEW OF A ROUGH MODEL OF THE VALVE GEAR.

been turned they are pressed against their seats tightly, thus allowing high pressures to be obtained without danger of leakage.

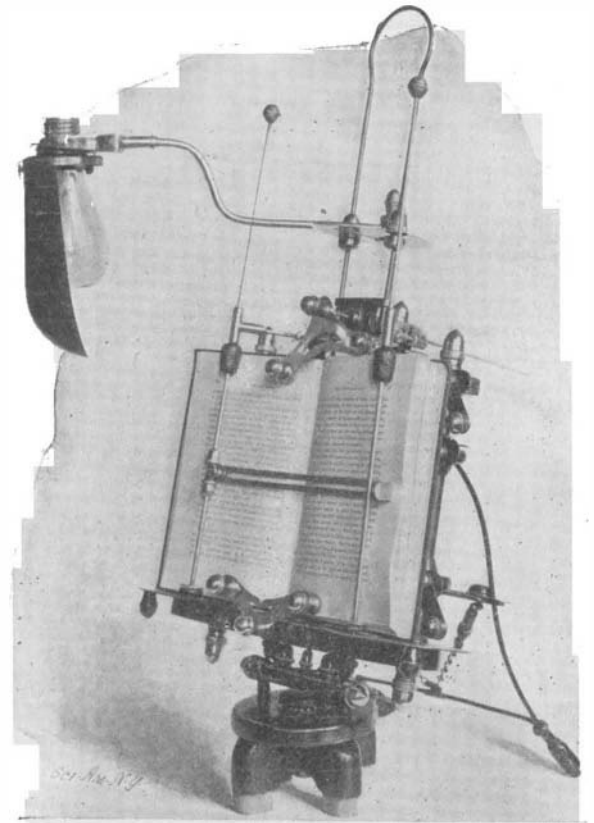
#### The Bressa Prize.

The Académie Royale des Sciences de Turin announces that a Prix Bressa of 9,600 francs (\$1,920) is open to competition among investigators and inventors of all nationalities. The prize will be awarded to the person who, in the opinion of the Academy, made the most brilliant or useful discovery in the four years 1897-1900, or who produced the most celebrated work in pure or applied science. Works intended for consideration in connection with the prize must be sent to the president of the Academy before the end of next year. The contest will close December 31, 1902. The right is reserved to award the prize to an investigator whose work is considered to be the most worthy of the honor, even though he does not submit an account of it.

#### A NEW BOOK OR COPY HOLDER FOR TYPEWRITERS.

The difficulty of holding books, loose sheets, or documents used by public speakers, copyists, and typewriters is overcome by means of a holder recently patented by Burgess T. Montgomery, of 752 Ninth Street, Washington, S. E., D. C.

The device comprises a rotary pedestal which car-



THE MONTGOMERY COPY-HOLDER.

ries parallel supporting-roads. On these rods the book-holder is slidably mounted. In order to hold the book open (particularly a thick book), two spreaders are employed, one for the bottom, one for the top, of the page. One spreader is mounted on the book-holder, and the other on the parallel supporting-roads above the holder. The essential feature of each spreader is an axial rod passing through a bearing in a line at right angles to the plane of the book-holder, the rod having two bearing-arms offset to the same side of the axial center, so that when rotated about the center the arms will both pass off the book to allow the page to be turned. The axial rod of each spreader is longitudinally adjustable to accommodate books of different thicknesses.

Pivoted leaves or wings at the bottom of the holder form extensions for books of various sizes and thicknesses.

Another feature of the invention which deserves to be mentioned is a line-spacer or indicator pivotally mounted on a side-rod between two friction-clamps.

From the two parallel supporting-roads extending upwardly from the base an arm extends outwardly, which carries an electric incandescent lamp, so that the copy can be illuminated, if it be so desired.

The holder has every motion that can be demanded by the copyist or reader, and is provided with means for receiving all kinds of copy, thick or thin, long or short.

#### The Current Supplement.

The current SUPPLEMENT, No. 1314, is commenced by a most interesting article on the maple sugar industry, accompanied by engravings showing the tapping of trees and the boiling of sirup. "Dock Equipment for the Rapid Handling of Coal and Ore on the Great American Lakes" is the continuation of an important article. "Some Links Between Natural History and Medicine" is by J. Arthur Thomson. "Progress of Agriculture in the United States" is by George K. Holmes. "A Model System of Water Works" is by F. O. Jones, and is accompanied by working drawings. The usual trade suggestions from the United States Consuls and Trade Notes and Receipts are published.

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